EFFECTIVENESS OF MODIFIED CONSTRAINT INDUCED MOVEMENT THERAPY (mCIMT) ON UPPER EXTREMITY FUNCTION AMONG POST STROKE HEMIPARETIC PATIENTS AT SELECTED REHABILITATION CENTERS, COIMBATORE.

BY

Reg.No: 301312851

A DISSERTATION SUBMITTED TO
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CERTIFICATE

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ABSTRACT

A Study was conducted to evaluate the effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on level of upper extremity function among post stroke hemiparetic patients at selected rehabilitation centers, Coimbatore.

The main aim of the study was to evaluate the effectiveness of modified Constraint Induced Movement Therapy on level of upper extremity function among post stroke hemiparetic patients. Quasi experimental pre-test post-test control group design was adopted. The study was conducted in Sivasakthi hi-tech physiotherapy center, Global neuro rehabilitation center and Seesha rehabilitation center, Coimbatore. 60 samples (30 each in interventional and control group) were selected using non probability purposive sampling technique. The conceptual framework selected for the study was based on modified Wiedenbach's Helping Art of Clinical Nursing Theory (1964). Pre-test was done for both groups using Motor Activity Log (MAL) and modified Sollerman Hand Grip function scale with observation checklist on the 1st day. Modified Constraint Induced Movement therapy with routine rehabilitation was implemented 4 hours daily for 14 consecutive days in the interventional group. Control group received routine rehabilitation for similar duration. Post test was conducted in both interventional and control group on 15th day. The data were analyzed using descriptive and inferential statistics. The findings stated that in pre-test the mean and standard deviation of motor arm function was 21.80 ± 13.38 in the interventional group and 19.33 ± 10.45 in the control group, in hand grip function 6.20 ± 4.80 and 5.43 ± 7.04 in interventional and control group respectively. In post-test, the mean and standard deviation of motor arm function was 32.83 ± 15.77 in the interventional group and 22.93 ± 10.37 in the control group, in hand grip function 10.87 ± 4.78 and 7.76 ± 6.77 in interventional and control group respectively. In interventional group the calculated paired 't' test value of motor arm function 12.67 was greater than the table value 2.46 at $p \leq 0.01$. The calculated paired 't' value of hand grip function 16.62 was greater than the table value 2.46 which was highly significant at $p \leq 0.01$. Hence, the hypothesis H_1 was retained. The calculated unpaired 't' values for motor arm function and hand grip function in interventional and control group were 2.82 and 4.18 respectively. These values were greater than the table value 2.39 at $p \leq 0.01$. Hence the hypothesis H_2 was retained.

In the interventional group, with regard to motor arm function there was a significant association found between working status and supportive members in the family. In hand grip function working status was found to be associated and supportive members in family was less significant in post test score. Hence, the hypothesis H_3 was accepted for the above mentioned variables. In motor arm function, there was a significant association found between samples and their selected clinical variables such as duration of stroke and duration of rehabilitation in the interventional group. In hand grip function, duration of stroke and duration of rehabilitation was found to be associated in post test score. Hence, the hypothesis H_3 was accepted for the above mentioned clinical variables. The findings of the study revealed that modified constraint induced movement therapy improved the level of upper extremity function among post stroke hemiparetic patients. Thus the inferential statistics displayed that mCIMT significantly improved the level of upper extremity function among post stroke hemiparetic patients.

CHAPTER I
INTRODUCTION

"Like an ability or a muscle, hearing your inner wisdom is strengthened by doing it."

-Robbie Gass

A stroke is a "brain attack" which can happen to anyone at any time. The term "brain attack" is used to describe the urgency of recognizing the clinical manifestations and treating it. Stroke is a medical emergency which can cause permanent neurological damage or death. Human functions such as movement, sensation or emotions that were controlled by the affected area of the brain are lost or impaired. The severity of the loss of function varies according to the location and extent of the brain involved.

The **World Health Organization** (**2005)** clinically defines, 'stroke as the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin'. A stroke is the disturbance in blood supply, when blood vessel ruptured or blocked by a clot, which cuts off the oxygen supply and nutrients to the brain, causing damage to the brain tissue. Stroke is a clinical syndrome divided into two broad classifications such as ischemic stroke which is caused by sudden occlusion of arteries supplying the brain, either due to a thrombus at the site of occlusion or formed in another part of the circulation. It accounts for 50% to 85% of all strokes worldwide. A haemorrhagic stroke occurs due to injury to a blood vessel wall and formation of clot. It accounts for 15% of all strokes worldwide.

In 2013, stroke was the second most frequent cause of death after heart diseases, accounting for 6.4 million deaths, in which ischemic stroke resulted in 3.3 million deaths and hemorrhagic stroke resulted in 3.2 million deaths. Almost half of the stroke patients live less than one year and two thirds of strokes occurred in those over 65 years old.

Worldwide stroke is the fourth leading cause of disability. According to the **WHO (2015**), each year 15 million people worldwide suffer from stroke. In that nearly 5 million people die and another 5 million people are left permanently disabled. It forecasts that disability-adjusted life years (DALYs) lost to stroke, will rise from 38 million in 1990 to 61 million in 2020. The prevalence of new or recurrent stroke is nearly 750,000 in each year and above 4 million is living with the residual effects of stroke which includes paralysis and disability. In India, stroke is one of the leading causes of death and disability. The prevalence rate ranges from 84-262/100,000 in rural areas and 334-424/100,000 in urban areas. Stroke signified 1.2% of total deaths in India.

Stroke risk increases with various risk factors such as age, sex, race, family history, hypertension, extreme alcohol consumption, smoking, tobacco, lack of physical exercise, obesity, high blood cholesterol level, diabetes mellitus, earlier TIA and heart diseases. The aged population have less chance of recovering from paralysis and disability; males are more at risk than females and ratio in India is 7:1. The prevalence of stroke among men may be due to smoking and drinking as well as higher among menopausal women in India.

The stroke cause sudden death depends on the site and severity of brain injury. The common symptoms are sudden weakness or numbness, confusion, aphasia, dysphasia, dysarthria, vision changes, altered motor function and unconsciousness. In worldwide, almost 85% of stroke survivors experience upper extremity hemiparesis immediately after stroke and between 55% and 75% of survivors continue to experience upper extremity functional limitations and diminished quality of life. Treatment to recover from lost function is called stroke rehabilitation and ideally takes place in a stroke rehabilitation units through the interdisciplinary team.

Rehabilitation programs are different in worldwide that most commonly, certain types like inpatient rehabilitation centres with acute care facilities, outpatient & home rehabilitation. In those rehabilitation programs they practice mobility, communication, ADLs and normal bowel and bladder patterns. Recent research has focused on techniques using robotics and constraint induced movement therapy. Constraint Induced Movement Therapy (CIMT) is a form of rehabilitation therapy that improves upper extremity function in stroke and other central nervous system damage victim by increasing the practice of their affected upper limb. CIMT has been shown to be an effective method of stroke rehabilitation irrespective of the level of initial motor ability, amount of chronicity, amount of previous therapy, affected side of hemiparesis or infarct site. A consistent exclusion criterion for CIMT has been less voluntary wrist and finger extension in the affected hand.

Constraint induced movement therapy is a repetitive practice and which is irritable, depressive and mentally challenging practice. So modified Constraint Induced Movement Therapy (mCIMT) is now being implemented by therapists to promote better compliance. 3 hours of treatment provides less improvement than 6 hours of treatment based motor activity log, however a significant and relevant effect can be gained from 3 hours of daily training.

IulyTreger, Lena Aidinof et al (2012) conducted a Single-blinded randomized controlled trail study among 28 samples to assess the effectiveness of modified constraint induced movement therapy (mCIMT) at loewenstein rehabilitation hospital, Israel. The mCIMT group received 1 hour daily physical rehabilitation session and unaffected arm was restrained for 4 hours for 2 weeks. The control group received routine physical rehabilitation. The subjects were requested to perform the following tasks such as transfer pegs from a saucer to a pegboard, grasp, carry, and release a hard rubber ball and eating using a spoon to remove the jelly from the plate, bring it towards the mouth, and then place it on another plate with the affected hand for 30 seconds. The number of repetitions in each test was recorded as an outcome. Study results revealed that mCIMT therapy group showed significantly greater changes in all 3 tests than control group.

Many researchers used modified constraint induced movement therapy (mCIMT) program to recover upper extremity function. mCIMT is an evidence-based program in an enriched environment to increase the use of the affected upper extremity. Many results recommended that mCIMT may be a successful method of improving function and use of the affected arms of patients exhibiting learned non-use.

Need of the study

National stroke association (2014) estimated that almost 10% of stroke survivors recover completely, 25% survivors recover with slight impairment, 40% experience moderate to severe impairments and they must require special care. 10% need care in a nursing home or other long term facility. 15% die shortly after the stroke. Nearly 14% of stroke survivors experience a second episode of stroke in the first year.

Rehabilitation plays an important role in prevention of stroke related complications, improvement of motor function and quality of life as well as prevention of recurrent stroke. Robot assisted therapy and constraint induced movement therapy are more advanced and evidenced-based practice to improve motor function. The effects of constraint induced movement therapy have been found to improve motor arm function and improve quality of life after completion of therapy. Constraint induced movement therapy (CIMT) attached with intensive and different exercise training has proven to be effective in reducing spasticity and increasing level of upper extremity function in chronic stroke patients. Nurses are in a good position to facilitate successful rehabilitation efforts. The nurse should incorporate physical therapy activities into the patient's daily routine for additional practice and repetition of rehabilitation efforts.

Mahale Rutuja, Karajgi Asmita et al (2013) conducted a study to assess effects of modified constraint induced movement therapy (mCIMT) on upper extremity performance in chronic stroke patients at Navi Mumbai, India. Researcher introduced shorter protocol of modified CIMT. 30 samples were selected and separated into two groups, (15 samples in experimental group and 15 samples in control group). Fugl Meyer scale, wolf motor function test and motor activity log were used to evaluate upper extremity performance. Researcher

recognized that statistically mCIMT as an adjunct to conventional therapy in improving the motor function and functional use of the affected upper extremity in chronic stroke patients.

During the clinical experience the researcher had observed that many of the stroke patients experienced discomfort due to hemiparesis. Hemiparetic patients are frazzled to do their daily activities of living and their family members were stressed to support the patients for a long duration. Modified constraint induced movement therapy (mCIMT) is a motivational and repetitive practice of the affected arm and simple form of body exercise that can be practiced at any place and any time, without any special equipment. So the researcher was interested to implement the mCIMT for post stroke hemiparetic patients to improve their upper extremity function.

Statement of the problem

"EFFECTIVENESS OF MODIFIED CONSTRAINT INDUCED MOVEMENT THERAPY (mCIMT) ON UPPER EXTREMITY FUNCTION AMONG POST STROKE HEMIPARETIC PATIENTS AT SELECTED REHABILITATION CENTERS, COIMBATORE"

Objectives

- To assess the level of upper extremity function among post stroke hemiparetic patients in interventional and control group.
- To evaluate the effectiveness of modified constraint induced movement therapy on upper extremity function among post stroke hemiparetic patients.
- To find out the association between the level of upper extremity function among samples and their selected demographic and clinical variables in interventional group.

Operational Definition

Effectiveness

It refers to the significant difference in the pre and post-test level of upper extremity function after implementation of modified constraint induced movement therapy, which is statistically significant.

Modified constraint induced movement therapy (mCIMT)

Modified constraint induced movement therapy refers to a short term therapy for improving upper extremity function of the post stroke patients which is achieved through placing a splint on the unaffected arm and practising physical exercise in affected arm for continuous 4 hours for 2 consecutive weeks.

Post stroke hemiparetic patients

It refers to the patients, who experienced stroke within 3 to 9 months with right or left upper extremity weakness.

Hypothesis

H_1: There is a significant difference between the mean pre-test and mean post-test level of upper extremity function among samples in interventional group, at $P < 0.05$.

H_2: There is a significant difference between the mean post-test level of upper extremity function among samples in interventional and control group, at $P < 0.05$.

H_3: There is a significant association between the level of upper extremity function among samples and their selected demographic and clinical variables, at $P < 0.05$.

Assumption

Modified constraint induced movement therapy will be more effective on improvement of upper extremity function.

Delimitations

- The study is limited to a sample size of 60.
- Data collection procedure is limited to 4 weeks.

Projected outcome

- The study will help to identify the level of upper extremity function among post stroke hemiparetic patients.
- Modified constraint induced movement therapy will improve the level of upper extremity function among post stroke hemiparetic patients.
- The findings of the study will help the health professionals to gain knowledge for further research.

Conceptual framework

The conceptual framework is the processor of theory. It provides a broad perspective for nursing practice, research and education. Conceptual framework plays several interrelated roles in the progress of science. Their overall purpose is to make scientific findings meaningful and generalizable.

Polit and Hungler (1995) state that, conceptual framework is interrelated concept on abstraction that is assembled together in some rational scheme by virtue of their relevance to a common theme. It is a device that helps to stimulate research and extension of knowledge by providing both direction and impetus.

The conceptual framework for the present study was adopted from Wiedenbach's Helping Art of Clinical Nursing Theory (1964). This theory directs action towards and explicit goal.

It consists of three factors:

- Central purpose
- Prescription
- Realities

Central purpose

Central purpose refers to what the nurse wants to accomplish to achieve the goal. It transcends the immediate intent of the task by specifically directing activities towards the objectives. In this study, central purpose refers to improvement of the level of upper extremity function.

Prescription

Prescription refers to the plan of action for individual. It specifies the nature of the action that will fulfil the nurse's central purpose and the rationale for that action. In this study, prescription refers to assessing the demographic and clinical variables of post stroke hemiparetic patients and their level of upper extremity function before administration of mCIMT.

Realities

Realities refer to the physical, physiological, emotional and spiritual factors that come into play in a situation involving actions. The five realities identified by Wiedenbach's are agent, recipient, goal, means and framework.

Agent : Agent is the researcher or designee, who has the personal attributes, capacities, capabilities, commitment and competence to provide action.

Recipient : Recipient is one who receives an intervention or action.

Goal : Goal refers to researcher's desired outcome.

Mean : The activities and devices used by the researcher to achieve the goal.

Framework : It refers to the facilities in which area, nursing is practiced. The conceptualization of the nursing practice for the present study has 3 steps.

Step I: Identifying a need for help

Identifying need for help determines patient's need for help based on the existence of a need. In this study, the need for help was identified by assessing the demographic variables, clinical variables and the level of upper extremity function among post stroke hemiparetic patients before administration of mCIMT

Step II: Ministering a needed help

Ministration refers to provision of needed help. It requires an identified need and a patient who wants help. After identifying the need for help, intervention to be implemented. In this study, ministering a needed help was provided as follows,

Agent : Investigator

Recipient : Post stroke hemiparetic patients between the age group of 30 - 60 Years.

Goal : To improve the level of upper extremity function.

Mean : Modified Constraint Induced Movement Therapy with routine rehabilitation.

Framework : Global neuro rehabilitation center, Seesha rehabilitation center and Sivasakthi hi-tech physiotherapy center.

Step III: Validating that a need for help was met

Validation refers to collection of evidence that shows a patient's need have been met and that this functional ability has been restored as a direct result of the nurse's actions. In this study, evaluation is established by assessing the level of upper extremity function after implementation of mCIMT.

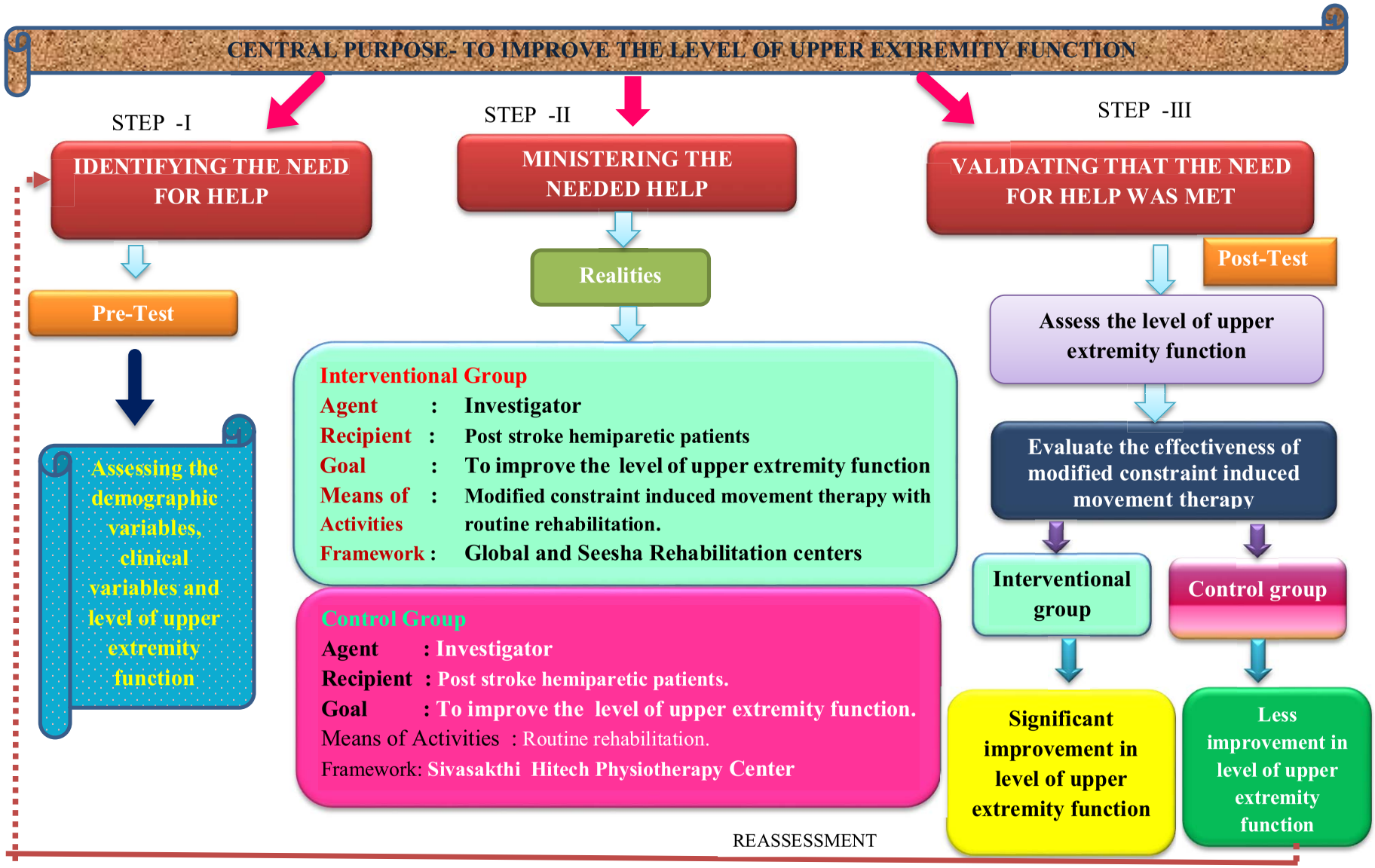

FIGURE-1

CONCEPTUAL FRAMEWORK BASED ON MODIFIED WIEDENBACK'S HELPING ART OF CLINICAL NURSING THEORY (1964)

CHAPTER II
REVIEW OF LITERATURE

The review of literature is essential to all steps of the research process. It is an account of what is already known about a particular phenomenon. The main purpose of literature review is to convey to the reader about the work already done and the knowledge and ideas that have been already established on a particular topic of research. From this prospective the review is based on broad, systemic and critical collection and evaluation of the important published scholarly literature and unpublished research findings, critically reading the literature is to develop a sound study that contribute to development of knowledge in the aspect of theory, research, evaluation and practice.

According to **Polit and Hungler (2003)** literature review is a written summary of the state of existing knowledge on a research problem. The task of reviewing research literature involves the identification, selection of a critical analysis and written.

In this study, the literature is classified into three sessions:

- Literature related to stroke rehabilitation for post stroke patients.
- Literature related to Constraint Induced Movement Therapy (CIMT) for post stroke hemiparetic patients.
- Literature related to modified Constraint Induced Movement Therapy (mCIMT) for post stroke hemiparetic patients.

(i) Literature related to stroke rehabilitation for post stroke patients.

Luca Mirela Cristina, **Daniela Matei et al (2015)** conducted a study to evaluate the effects of Mirror therapy program in addition with physical therapy on upper limb recovery among 30 subacute ischemic stroke patients, 15 samples received a comprehensive rehabilitative treatment, 8 samples received only control therapy (CT) and 7 samples received mirror therapy (MT) for 30 min every day, 5 times a week, for 6 weeks with conventional therapy. Researchers used Brunnstrom stages, Fugl–Meyer Assessment scale (upper extremity), the Ashworth Scale, and Bhakta Test (finger flexion scale) to assess changes in upper limb motor recovery and motor function. After 6 weeks of treatment, post test result revealed that patients in both groups had significant improvements but mirror therapy (MT) showed greater improvements compared to the CT group. It concluded that mirror therapy (MT) was an easy and low-cost method which improves motor functions, manual skills and ADL for stroke patients.

Vijay (2014) conducted a quasi-experimental comparative study among 20 patients to assess the effectiveness of constraint induced aphasia therapy (CIAT) in improving the level of speech among post stroke aphasia patients in a private multispecialty hospital, Coimbatore. Experimental group underwent CIAT for 3 hours per day for 10 consecutive days. The Bilingual Aphasia Test (BAT) scale was used to test level of speech. The result shown the comparison of pre-test and post-test level of speech using BAT scores in both groups showed that the calculated 't' values (experimental group 't'=33.9 & control group 't'=14.9) are greater than the table values at $p<0.001$ which reveals that CIAT is better than the routine speech therapy in improving level of speech, verbal communication and facilitating the satisfactory demand.

Murali (2013) conducted a quasi-experimental study to evaluate the effectiveness of Sensory Stimulation Program (SSP) on motor function and verbal response among 30 stroke patients at Salem. Results revealed that SSP was effective with statistical difference ('t'= 4.16, mean=8.3, S.D=6.8) between two groups. There was no association between the post-test motor function and verbal function. It concluded that SSP was effective in improving motor function and verbal response.

Harris JE, Miller WC et al (2009) conducted a multi-site randomized controlled trail to assess a self-administered Graded Repetitive Arm Supplementary Program (GRASP) improves motor arm function for stroke patients at Canada. Researcher randomly selected 103 patients for 4 weeks of upper extremity therapy. Among them 53 patients received GRASP and 50 patients in control group received educational protocol. Results were measured by Chedoke Arm and Hand Activity Inventory (CAHAI) before and after 5 months of treatment. Results revealed that GRASP group showed greater improvement in upper limb function (CAHAI) compared to the control group (mean change score: 14.1 vs 7.9, $p<0.001$). Significant changes were found in improving grip strength and paretic upper limb use in GRASP protocol groups.

Gert Kwakkel, Boudewijn J.Kollen et al (2006) used randomized control trail on effects of Robot-Assisted Therapy on upper limb recovery after stroke. Ten studies involving, 218 patients were included in the synthesis. Robot arm and shoulder assisted therapy was implemented for the samples. Researchers measured results like estimated effect size (ES) and the summary effect size (SES) were calculated for motor recovery and functional ability. There was a significant improvement in upper limb motor function after stroke for upper arm robotics.

Gert kwakkel, Roland Van Peppen et al (2004) conducted a randomized control trial among 2689 stroke patients, to assess the effects of Augmented Exercise Time Therapy (AETT) on activities of daily living (ADL), walking and dexterity. Results were measured by estimated effect size (ES) and the summary effect size (SES) stated in standard deviation units (SDU) were calculated for ADL and walking speed. The results revealed that augmented exercise therapy has a small but favorable effect on ADL, particularly if therapy is augmented at least 16 hours within the first 6 months after stroke.

(ii) Literature related to Constraint Induced Movement Therapy (CIMT) for post stroke hemiparetic patients.

Bushra Rehman, Praveen Rawat et al (2015) conducted a study on the effectiveness of bobath approach versus constraint induced movement therapy (CIMT) on motor arm function and the hand dexterity function in 30 post stroke patients in Bangalore. Samples were randomly separated into group A and group B, measured by the Wolf Motor Function Test and Jebsen Taylor Hand Function Test (JTHFT). Bobath group was treated for 1.5 hours per day during 5 consecutive weekdays for 4 weeks whereas the CIMT group received training for 2 hours per day during 5 consecutive weekdays for 3 weeks. There was no significant differences in Wolf motor function test at post-test ($p=0.861$) and at follow up ($p = 0.395$). There was a significant improvement in Jebsen Taylor Hand Function test in both the groups with slight better improvement in Group B compared to Group A. Results revealed that CIMT was slightly more efficient than the Bobath concept in improving the dexterity function.

Gudlavalleti Aashrai SV, Taimni Vishal et al (2015) conducted a prospective non-randomized clinical trial to compare CIMT and Neuromuscular Electrical Simulation on Clinical Outcomes in 126 Chronic Stroke patients. Both therapies were given for 8 weeks duration. Patients were evaluated by using Modified Rankin Scale (mRS), Barthel Index (BI), Fugl-Meyer Scale (FMA) and Motor Assessment Scale at baseline and at 2 and 4 months of treatment. Both CIMT and NMES groups showed significant improvement among post stroke rehabilitation patients at ($p<0.001$). Although CIMT may show a greater improvement in initial stages, there was no significant change at a later stage.

Ann-Christin Eliasson and Lena Krumlinde Sundholm (2007) conducted a study to assess the effectiveness of constraint-induced movement therapy (CI) among 41 young children with hemiplegic cerebral palsy. Twenty-one children (13 females, 8 males) were received the CI movement therapy and 20 children (12 males, 8 females) kept as a control group. Children in the CI therapy group were expected to wear a restraint glove for 2 hours each day for 2 months. Assisting Hand Assessment (AHA) was used to assess at onset, after 2 months and 6 months after the first assessment. A significant improvement was found between group and AHA measure (ANOVA, $F2, 74=5.64$, $p=0.005$). CI therapy improved their ability to use their hemiplegic hand significantly more than the control group after 2 months.

Steven L. Wolf, Carolee J. Winstein, et al (2006) conducted an experimental study on effects of CIMT on upper extremity function for 3 to 9 months after stroke at US academic institutions. Samples were allocated to receive either CIMT (n = 106; wearing a restraining mitt on the less-affected hand

while engaging repetitive task practice and behavioural shaping with the hemiplegic hand) or usual and customary care (n = 116, control group). Patients were determined by sex, pre stroke dominant side, affected side of stroke and level of paretic arm function. There was a statistically significant improvement in motor arm function among interventional group than the control group in both the WMFT Performance Time (decrease in mean time from 19.3 seconds to 9.3 seconds [52% reduction] vs from 24.0 seconds to 17.7 seconds [26% reduction]) between two groups. In the MAL Amount of Use (on a 0-5 scale, increase from 1.21 to 2.13 vs from 1.15 to 1.65; in MAL Quality of Movement (on a 0-5 scale, increase from 1.26 to 2.23 vs 1.18 to 1.66) respectively.

Bonifer NM, Anderson KM et al (2005) conducted a study on efficacy for patients with minimal upper-extremity motor ability at outpatient clinic within a rehabilitation hospital among 20 participants at USA. Results were measured by Fugl-Meyer Assessment (FMA), Graded Wolf Motor Function Test (GWMFT) and Motor Activity Log (MAL). Research findings revealed that there was a significant influence of treatment on upper-extremity motor impairment as assessed by the FMA, MAL and GWMFT. Between pre-treatment and post treatment assessments POST test showed significant differences between motor impairment scores and improvements in motor impairment scores remained stable one month after completion of formal treatment.

Alexander W. Dromerick, Dorothy F. Edwards et al (2000) conducted prospective, randomized, controlled clinical trial among 23 samples within 14 days of ischemic stroke to assess the effectiveness of CIMT during acute

rehabilitation in Washington university school of medicine. The total Action Research Arm Test (ARA) was used after 14 days of treatment. The Barthel Index (BI) at discharge from inpatient rehabilitation was used as the measure of basic ADL function. Functional independence measures (FIM) were used to assess upper extremity function such as eating, grooming, bathing, upper extremity dressing, and lower-extremity dressing. 21 samples completed the 14-day treatment for 2 hours per day; 5 days per week, for 2 consecutive weeks. The result showed that mean total ARA score was significantly higher CIMT group than the traditional treatment group (F1, 15511.70, P, 0.003).The post-test grip, pinch, grasp, and gross motor scores for each group were compared by using Mann-Whitney U tests scores and found to be higher for patients in the CIMT group; only the pinch subtest scores achieved statistical significance (U513.50, P, 0.03). The BI and FIM item scores were not showing significant differences at discharge (t=51.14, P, 0.27). A clinical trial of CIM therapy during acute rehabilitation was feasible and associated with less arm impairment at the end of treatment.

(iii) Literature related to modified Constraint Induced Movement Therapy (mCIMT) for post stroke hemiparetic patients

Wei-ming Zhang, Shuai Yang et al (2015) conducted a study to assess the effects of modified constraint induced movement therapy (mCIMT) on the activities of daily living (ADL) in 60 patients with acute stroke in Ruijin Hospital. The researcher used modified Barthel Index (mBI), Fugl-Meyer Assessment (FMA) and Berg Balance Scale (BBS) to assess the ADL and motor function. Control group were received routine rehabilitation training, 60 min for twice a day, 5 days per week and experimental group received mCIMT treatment with the

similar duration. After 2 weeks, continuous training were given for 4-week. Each patient received treatment for 2 weeks, 6 weeks, 12 weeks on the ADL and motor function. The results indicated, in both groups there were increased mBI (P = 0.004, 0.000, 0.000), FMA (upper limb: P = 0.000) and BBS scores (P = 0.005, 0.000, 0.000) 2, 6, 12 weeks after treatment. FMA (lower limb) score was increased 6 and 12 weeks after treatment (P = 0.000). Compared to the control group, patients in mCIMT group got increased mBI, FMA and BBS scores 2, 6, 12 weeks after treatment shows the effectiveness of mCIMT was greater to general routine rehabilitation treatment.

Ju Hyung Park, Nayun Lee et al (2015) conducted a time series study for chronic stroke clients to investigate the impact of mCIMT on upper extremity function and the daily life of chronic stroke patients. The subjects were 2 patients who was a 47 years old male who had right hemiplegia due to middle cerebral artery infarction that had occurred 48 months earlier. Participant 2 was a 68 years old female who had left hemiplegia due to middle cerebral artery infarction that had occurred 60 months earlier. Both participants had used their right hand as their dominant hand before stroke and participated for 30 minutes each of conservative physical therapy and occupational therapy for 5 times a week. mCIMT was implemented 5 days a week for 2 weeks, and the subjects performed their ADL with wearing mittens in their less affected arm for 6 hours a day, including the 2 hours of the regular therapy. The assessment was conducted before and after intervention for 5 times in 3 weeks. The upper extremity function was measured by using the box and block test and a dynamometer. Daily activities of living were measured by using the modified Barthel index. The results were

evaluated by using a scatterplot and linear regression, showed that significant improvement in the upper extremity functions after mCIMT and the performance of ADL on chronic stroke patients.

U. Ganapathy Sankar (2015) conducted a pilot study on modified constraint induced movement therapy for children with hemiplegic cerebral palsy to improve upper extremity function at Chennai. Quantitative evaluative research design was used to compare pre and post-test scores of experimental group. Convenience sampling technique was used to select 10 children's with hemiplegic cerebral palsy and being aged between 36 months to 60 months. Researcher used QUEST scale (Quality of upper extremity skills test) to measure upper extremity function. mCIMT was given for the period of 20 sessions one hour per day for each child individually. The results showed that there was statistically significant difference between pre & post-test total score $t = 4.68$, $p < 0.01$ for QUEST scale; $t = 3.07$, $p < 0.05$ for dissociate moment; $t = 2.93$; $p < 0.05$ for grasps; $t = 5.20$, $p < 0.01$ for weight bearing and $t = 22.90$, $p < 0.05$ for protective extension respectively. So mCIMT was an important intervention for improving upper extremity function for small children with hemiplegic cerebral palsy.

Siddharth Mishra and Jeba Chitra (2014) conducted a pre and post-test experimental study to assess the effects of mCIMT for lower limb on Weight Bearing Symmetry and Balance in stroke patients at Bangalore. 22 subacute or chronic medically stable stroke patients with first time stroke between the age group of 30-70 years were selected and received mCIMT. Duration of treatment was 1 hour per day for 6 days per week for two weeks. Result showed that the mean pre-test value 40.96% ± 3.94%, post-test value was 48.31% ± 1.15% and the

difference in weight distribution on affected leg pre-post values 7.35% ± 3.47%. In Berg Balance Scale, the mean pre-test value was 32.04 ± 2.17 and the post-test value was 50.31 ± 1.96. The difference in scores between pre and post values was 18.27 ± 2.64. Statistical significant difference in Berg Balance scores ($p < 0.001$) showed improvement in stroke patients.

Yadav Raj Kumar1, Sharma Rajendra (2013) conducted a prospective randomized case control study to assess the effectiveness of mCIMT in hand functions of hemiparetic stroke patients, at New Delhi. 30 patients received conventional rehabilitation program (control group) and 30 patients participated in a mCIMT program in addition to the conventional rehabilitation program (interventional group). The mCIMT included 3 hours therapy sessions emphasizing the affected arm use in general functional tasks, 3 times a week for 4 weeks. Their normal arm was also constrained 5 days per week for 5 hours. The FMA score for upper extremity and MAL scale comprising Amount of Use (AOU) score and Quality of Use (QOU) score. The interventional group exhibited greater motor recovery on the FMA score at 1 month (13.43) and 3 months (15.9) than the control group (10.7 and 12.23). The mean improvements in AOU scores in the interventional group at 1 month (6.57) and 3 months (8.2) were greater than control group (5.47 and 6.63). This study reaffirms the efficacy of mCIMT in improving the motor recovery and functional use of affected hand of stroke patients.

Masashi hosomi, Tetsuo koyama et al (2012) conducted a study to assess the effectiveness of modified CIMT on stroke patients at Japan. A supervised self-training protocol was used among 40 chronic hemiparetic patients

after 180 days of stroke. FMA and determined training tasks were used to measure the primary complaints. FMA, Wolf Motor Function Test (WMFT), and Motricity Index (MI) were used to assess upper extremity function before and after interventions. Researcher implemented supervised self-training program for 5 hours for 10 consecutive days. Study result reveals that pre and post intervention, scores for the FMA upper extremity items, WMFT functional ability scale, WMFT performance times, and MI indicated significant improvements, from 49.35 ± 10.1 (mean ± SD) to 52.88 ± 8.0 points, 3.48 ± 0.65 to 3.72 ± 0.67 points, 14.37 ± 13.22 to 10.58 ± 11.97 seconds, and 75.0 ± 12.0 to 77.7 ± 12.0 points, respectively. This showed that self-training based Constraint induced (CI) therapy protocol is effective for improving upper extremity function.

Lee, kyoung et al (2011) conducted a study of mCIMT improves fine and gross motor performance of the upper limb in Parkinson disease. 20 individuals with Parkinson disease were selected for the study. They were divided into two groups, both groups had 10 samples. The experimental group implemented mCIMT for 4 weeks (3 hours/day, 5 days/week). The control group implemented general upper limb exercises on the same schedule. Results were measured by Box and block test, Fugl-Meyer assessment, and action research arm test. Results revealed that post test scores in experimental group was significantly increased, in box and block test 35.8 ± 2.6 to 44.8 ± 3.4, Fugl-Meyer assessment from 33.6 ± 1.5 to 53.7 ± 3.1, action research arm test scores from 35.1 ± 4.9 to 50.8 ± 3.6 than Control group score 33.1± 2.2 to 34.8 ± 2.7. Study concluded that mCIMT improves fine and gross motor performance of the upper limb in Parkinson patients.

A.Siebers and U.Oberg (2010) conducted a prospective consecutive quasi-experimental study to assess the effectiveness of mCIMT on spasticity and motor function of the affected arm among 20 chronic stroke patients at Sweden. The non-affected arm was placed in a restricting position belt for 90% of the waking hours for 2 week. An individual training program was implemented 6 hours per day for 2 weeks. Paried shaping, task practice and exercise were practiced on the basis of individual problems and available resources. Researcher used Modified Ashworth Scale (MAS), active range of motion (AROM), grip strength, Motor Activity Log (MAL), Sollerman hand function test, and Box and Block Test (BBT) to measure spasticity and motor function. Study reveals that there was a decreased spasticity and improvements in motor function. In AROM (median change of elbow extension 5° dorsiflexion of hand 10°), grip strength (20 Newton), and functional use after the 2 week training period. Study suggested that modified CIMT may decrease spasticity and increase functional use of affected arm.

Kenji Numata, Takashi murayama et al (2008) conducted a case study effect of mCIMT on lower extremity hemiplegia due to a higher motor area lesion at Japan. mCIMT was implemented from awakening to bedtime except bath time with his non- affected limb fixed with a knee splint in the hospital ward. Totally 19.5 hours he carried the application for 2 days. After the intervention voluntary movement of the affected leg occurred and functional improvement was observed. Findings showed that unilateral supplementary motor area (SMA) strongly contributes to movements of the ipsilateral limb and that the plasticity of the SMA.

Ching-yi Wu, Chia-ling Chenet al (2007) conducted a randomized controlled trial of modified constraint-induced movement therapy for elderly stroke survivors regarding changes in motor impairment, daily functioning, and quality of life. 26 elderly stroke patients (age group of 72 years) with 0.5 to 31 months post onset of a first-ever cerebrovascular accident were selected. Samples received either mCIMT or traditional rehabilitation for a period of 3 weeks. Fugl-Meyer Assessment (FMA), FIM instrument, Motor Activity Log (MAL), and Stroke Impact Scale (SIS) were used to assess the severity of motor impairments, daily activities and health-related quality of life (HRQOL) in elderly stroke survivors. The result revealed that mCIMT group significantly greater improvements in motor function, daily function, and health-related quality of life (HRQOL) than the traditional rehabilitation group.

Summary

This chapter dealt with literature related stroke rehabilitation, constraint induced movement therapy and modified constraint induced movement therapy.

CHAPTER III
RESEARCH METHODOLOGY

Research methodology is the development and evaluation of data collection instrument, scale or technique. The role of methodology consists of procedure and technique for conducting a study**. (Feedith Haber 2006)**

This chapter presents research design, population, setting, sample size, sampling technique, sampling criteria, variables, description and construction of tool, validity, reliability, pilot study, data collection procedure and data analysis adopted for the study.

Research Approach

The research approach instructs the researcher from where the data is to be collected and how to analyze the data. It also suggest possible conclusion and helps the researcher in ensuring specialist question in the most accurate and efficient way. **(Rose Grippe and Gorney Lucero 1994).**

In this study, quantitative evaluative approach was used to achieve the objectives of the study.

Research Design

Research design is the overall plan for addressing a research question including specification for enhancing the study's integrity**. (Denise.E.Polit 2008)**

In this study, Quasi experimental pre-test post-test control group design was selected to evaluate the effectiveness of modified constraint induced movement therapy (mCIMT) on upper extremity function among post stroke hemiparetic patients

The design adopted for present study is represented as:

Interventional Group	O1	X	O2
Control Group	O1	-	O2

O1 - Pre test

X - Implementation of modified constraint induced movement therapy.

O2 - Post test

Setting of the Study

Polit and hungler, (1999) states that setting is the physical location and condition in which data collection takes place. Setting of the study is essential constituent to ensure effective planning to conduct a research study. This study was conducted in 3 selected rehabilitation centers such as Global Neuro Rehabilitation center, Seesha rehabilitation center and Sivasakthi hi-tech physiotherapy center.

The interventional group was selected from two centers, Global Neuro Rehabilitation center which is located in Periyanaicken Palayam, Coimbatore, 15 kilometers away from Kongunadu College of Nursing. Global neuro rehabilitation center has approximately 35 post stroke hemiparetic patients which has 40 bedded with all advanced facilities, inpatient department, outpatient department and home rehabilitation units. Seesha rehabilitation center is located in Karunya nagar, Coimbatore, 20 kilometers away from Kongunadu College of Nursing. It has 8 post stroke hemiparetic patients which has 20 bedded with all facilities, inpatient department, outpatient department and home rehabilitation unit.

The control group for the present study was selected from Sivasakthi hi-tech physiotherapy center, Bhavani and it is 65 kilometers away from Kongunadu College of Nursing. It has 45 bedded with all rehabilitation facilities and there were 38 post stroke hemiparetic patients.

Population

Population is defined as the entire aggregation of cases that meet a designed set of criteria. **(Polit and Hungler, 1999)**

The population of the present study was post stroke hemiparetic patients with limited upper extremity function.

Sampling

Sample

Sample is the subset of total population selected to participate in a research study.

The sample of the present study was post stroke hemiparetic patients with limited upper extremity function.

Sample Size

According to **Suresh K Sharma (2011),** sample size is the number of subjects, events behaviors, or situations that are examined in a study.

The sample size for the study was 60 post stroke hemiparetic patients with limited upper extremity function. From 60 patients, 30 patients were assigned to interventional group selected from Global neuro rehabilitation center and Seesha rehabilitation center, Coimbatore and 30 post stroke hemiparetic patients from Sivasakthi hi-tech physiotherapy center, Bhavani were assigned as control group.

Sampling Technique

Polit and Hungler, 1999 defined sampling technique is the process of selecting a portion of the population to represent the entire population.

Non probability purposive sampling technique was adopted for the study.

Criteria for sample selection

Patients were selected using the following criteria.

Inclusion criteria

- ❖ Patients who experienced stroke within 3-9 months.
- ❖ Patients with right and left upper extremities hemiparesis or weakness.
- ❖ Patients between the age group of 30 – 60 years
- ❖ Patients who have 10 degree active wrist extension, 10 degree active thumb abduction and 10 degree active extension of any other two digits on affected hand which is measured by tonometry.

Exclusion criteria

- ❖ Post stroke hemiparesis patients affected with cognitive disturbances.
- ❖ Patients who are not willing to participate
- ❖ Patients with hemiparesis associated with other illness.

Variables

According to **Suresh K Sharma (2011),** research variables are the qualities, properties, or characteristics which are observed or measured in a natural setting without manipulating and establishing cause and effect relationship. In this study,

Independent Variable :

Modified constraint induced movement therapy.

Dependent Variable :

Level of upper extremity function

Description of the tool

Tool was organized in to 4 sections.

Section A - Demographic variables:

Demographic variables consist of age, sex, education, working status, social habits, food habit, pre stroke exercise and supportive members of family.

Section B–Clinical variables:

Clinical variables contain type of stroke, side of hemiparesis, pre stroke dominant side and duration of stay in rehabilitation center.

Section C- Motor Activity Log (MAL):

Motor activity log was used to assess the level of motor arm function. Motor activity log with observation checklist consists of 15 items to examine the amount and how well patients have used their affected arm. The answers were interpreted based on 6 point rating scale (0-5).

The minimum and maximum scores were 0 and 150 respectively. The scores were interpreted as follows,

Table No 3.1 Interpretation for Motor Activity Log (MAL)

Description	Scores
No motor arm function	0
Very poor motor arm function	1 – 30
Poor motor arm function	31 – 60
Fair motor arm function	61 – 90
Almost normal motor arm function	91 – 120
Normal motor arm function	121 – 150

Section D- Modified Sollerman hand grip function scale

Modified Sollerman hand grip function scale with observation checklist which consists of 10 items was used to assess hand grip function. The answers were interpreted based on 5 point rating scale (0-4).

The minimum and maximum scores were 0 and 40 respectively. The scores were interpreted as follows

Table No 3.2 Interpretation for modified Sollerman hand grip function scale

Description	Scores
No hand grip function	0
Very poor hand grip function	1 – 9
Poor hand grip function	10 - 19
Fair hand grip function	20 - 29
Almost normal hand grip function	30 - 39
Normal hand grip function	40

Content validity

Validity is a quality criterion referring to the degree to which interferences made in a study are accurate and well founded in measurement, the degree to which an instrument measures what it intended to measure. [**Polit and Beck (2010)]**

The research tool along with request letter for validation was submitted to five experts in the field of medical surgical nursing and one expert from neurology department. Experts were requested to check for the relevance, sequence and adequacy of language of tool. Modification were incorporated as per expert's opinion and used for the main study.

Reliability of the instrument

Reliability of the tool is defined as, the extent to which the instrument yield the same result on repeated measures. **(Polit and Hungler 2004)**

The reliability of the tool was established by using Interrater method and calculated by Karl Pearson coefficient correlation and found to be r = 0.98. This showed that the tool was highly reliable for the proceeding of the study.

Pilot study

Pilot study refers to a small scale version or trial run done in preparation for a major study. Pilot study tests the reliability, practicability, appropriateness and feasibility of the study and the tool. [**Polit and Hungler, (1999)]**

After obtaining permission from the administrator of the rehabilitation center, pilot study was conducted at outpatient department of Global physiotherapy clinic, Coimbatore. The study was carried out over a period of 9 consecutive days from 16-02-2015 to 24-02-2015. Ten patients who fulfilled the inclusion criteria were selected, 5 in the interventional group and 5 in the control group.

After self-introduction, the investigator obtained willingness from the patients. A pre-test level of upper extremity function was assessed by using the tool among interventional and control group. Followed by pre-test modified constraint induced movement therapy was demonstrated and the patients were made to practice along with routine rehabilitation for 7 consecutive days in the interventional group. Patients in control group received only routine rehabilitation. After 1 week, the post-test was conducted and analyzed. The pilot study confirmed the adequacy of the tool and techniques.

Ethical consideration

Prior permission was sought from the administrators of rehabilitation centers including ethical committee clearance. Written consent was obtained to conduct the study and assurance was given for the confidentiality of the information from the patients. Routine physiotherapy was not altered and withheld. Patients were allowed to withdraw from the study at time.

Data collection procedure

Data was collected during the month of March and April from 16-03-2015 to 14-04-2015 for 4 weeks. After obtaining permission from the administrator of rehabilitation centers, patients were selected who fulfilled the inclusion criteria. Non probability purposive sampling technique was used to select 60 patients, 30 patients in the interventional group and 30 patients in the control group.

After self-introduction, the investigator explained the nature of the study and obtained written consent from the patients. The demographic and clinical variables were collected from the patients. Pre-test level of upper extremity function was assessed through motor activity log and modified Sollerman hand grip function scale with observation checklist, among interventional group on first day of the study. Followed by, modified constraint induced movement therapy was demonstrated and the patients were made to practice the same for 14 consecutive days in Global neuro rehabilitation center and post-test was conducted on 14^{th} day. The same was repeated in Seesha rehabilitation center, Coimbatore for 14 consecutive days and post-test was done on 14^{th} day.

The non-affected arm of the patients was restrained with splint for 4 hours and affected arm was practiced with repeated activities such as peg board,

transferring jelly with spoon, picking and transferring the nuts, grasping the smiley ball for 4 hours under the supervision of the researcher. The control groups were selected from Sivasakthi hi-tech physiotherapy center, Bhavani. Pre-test was administered and received routine rehabilitation. Post-test was done after 2 weeks. Ethical aspects were considered throughout the study.

Plan for data analysis

The data were edited, coded and entered in the master sheet. The data were analyzed using descriptive and inferential statistics.

Table No: 3.3 Plan for data analysis

Type of statistics	Method	Purpose
Descriptive statistics	Frequency, Percentage, Mean, Standard deviation, Mean difference	• To analyze the demographic and clinical variables. • To assess the level of upper extremity function among samples.
Inferential statistics	Paired 't' test	• To compare pre-test and post-test scores on level of upper extremity function among samples in interventional group.
	Unpaired 't' test	• To compare post-test scores on level of upper extremity function among samples between interventional and control group.
	Chi square	• To find-out association between level of upper extremity function among samples and their selected demographic and clinical variables.

Summary

This chapter deals with description of research approach, research design, study setting, target population, sample and sampling technique, selection criteria, selection and development of the tool, content validity and reliability, pilot study, data collection procedure and plan for data analysis.

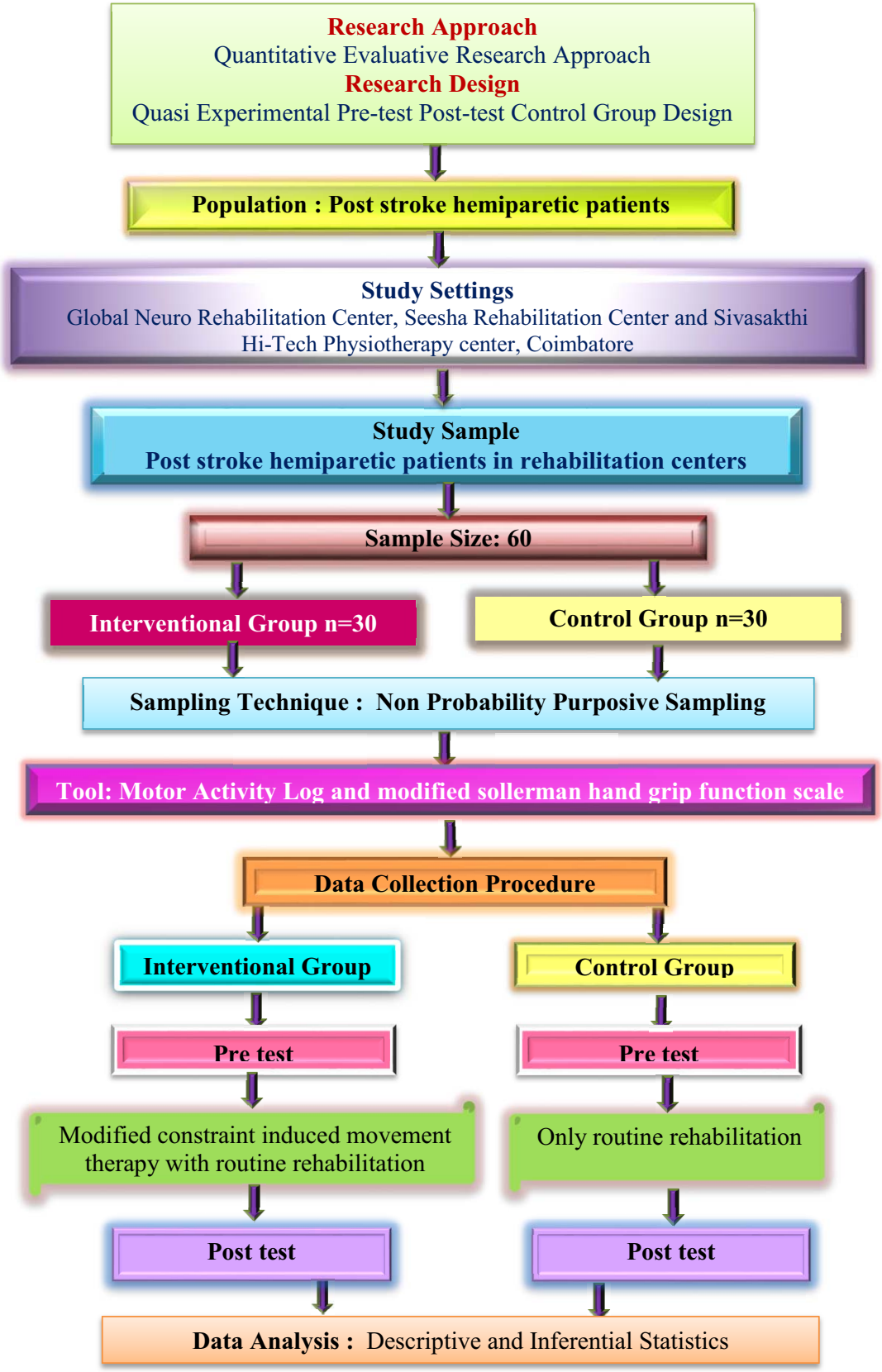

Figure 3.1 Schematic Representation of Research Methodology

CHAPTER IV
DATA ANALYSIS AND INTERPRETATION

This chapter deals with analysis and interpretation of the data on effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on level of upper extremity function among post stroke hemiparetic patients between the age group of 30 and 60 years.

Polit and Hungler (2006) states that, the statistical analysis helps the researcher to make sense of quantitative information. Statistical procedure enable researcher to summarize, evaluate, interpret and communicate numeric information.

The data were collected by using Motor activity log (MAL) and modified Sollerman hand grip function scale with observation checklist and analyzed using descriptive and inferential statistics which are necessary to provide substantive summary by the results in relation to the objectives.

Objectives

- To assess the level of upper extremity function among post stroke hemiparetic patients in interventional and control group.
- To evaluate the effectiveness of modified constraint induced movement therapy on level of upper extremity function among post stroke hemiparetic patients.
- To find out the association between level of upper extremity function among samples and their selected demographic and clinical variables in interventional group.

Presentation of Data

The findings of the study were grouped, analyzed, organized and presented under the following broad sections.

Section I

Distribution of patients according to their demographic and clinical variables in interventional and control group.

Section II

Assess the level of upper extremity function among patients in interventional and control group.

Section III

Comparison of pretest and post-test scores on level of upper extremity function among interventional and control group.

Section III

Testing hypotheses

a. Comparison of pre-test and post-test scores on level of upper extremity functions among interventional group.

b. Comparison of post-test scores on level of upper extremity function among interventional and control group.

c. Association between the pre and post-test scores on level of upper extremity function among samples and their demographic and clinical variables.

SECTION – I

Distribution of patients according to their Demographic Variables

Table 4.1

Frequency and Percentage distribution of patients according to their demographic variables in Interventional group and Control group

n=60

S. No	Demographic Variables	Interventional group n=30		Control group n=30	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	**Age**				
	1.1) 30-40 Years	3	10	6	20
	1.2) 41-50 Years	9	30	9	30
	1.3) 51-60 Years	18	60	15	50
2.	**Sex**				
	2.1) Male	23	76.67	21	70
	2.2) Female	7	23.33	9	30
3.	**Education**				
	3.1) No primary education	8	26.67	9	30
	3.2) Primary education	6	20	6	20
	3.3) Secondary education	8	26.67	4	13.33
	3.4) Higher secondary	2	6.66	2	6.67
	3.5)Degree & above	6	20	9	30
4.	**Working Status**				
	4.1) Heavy worker	12	40	12	40
	4.2) Moderate worker	15	50	18	60
	4.3) Sedentary worker	3	10	0	0

S.No	Demographic Variables	Interventional group n=30		Control group n=30	
		Frequency	Percentage (%)	Frequency	Percentage (%)
5.	**Social Habit**				
	5.1) Smoking	1	3.33	6	20
	5.2) Alcoholism	5	16.67	8	26.67
	5.3) Smoking & Alcoholism	9	30	5	16.67
	5.4) Tobacco chewing	0	0	4	13.33
	5.5) Other habits	0	0	0	0
	5.6) No habits	15	50	7	23.33
6.	**Food Habit**				
	6.1) Vegetarian	2	6.67	1	3.33
	6.2) Non-Vegetarian	28	93.33	29	96.67
7.	**Prestroke Exercise**				
	7.1) Yes	5	16.67	2	6.67
	7.2) No	25	83.33	28	93.33
8.	**Supportive members in family**				
	8.1) Parents	4	13.33	7	23.33
	8.2) Spouse	17	56.67	19	63.33
	8.3) Children	6	20	2	6.67
	8.4) Siblings	3	10	2	6.67
	8.5) Others	0	0	0	0

Table 4.2

Frequency and Percentage distribution of patients according to their clinical variables in interventional and control group

n= 60

S. No	Clinical variables	Interventional group n=30		Control group n=30	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	**Type of stroke**				
	1.1) Hemorrhagic stroke	15	50	11	36.67
	1.2) Ischemic stroke	15	50	19	63.33
2.	**Duration of stroke**				
	2.1) 3 - 5 months	8	26.67	17	56.67
	2.2) 5 - 7 months	9	30	10	33.33
	2.3) 7 - 9 months	13	43.33	3	10
3.	**Affected arm**				
	3.1) Right arm	15	50	12	40
	3.2) Left arm	15	50	18	60
4.	**Pre stroke dominant side**				
	4.1) Right arm	29	96.67	28	93.33
	4.2) Left arm	1	3.33	2	6.67
5.	**Duration of Rehabilitation**				
	5.1) Less than 3 months	20	66.67	28	93.33
	5.2) 3 – 5 months	6	20	0	0
	5.3) 6 – 9 months	4	13.33	2	6.67

4.1 Distribution of patients according to their demographic variables in Interventional and Control group

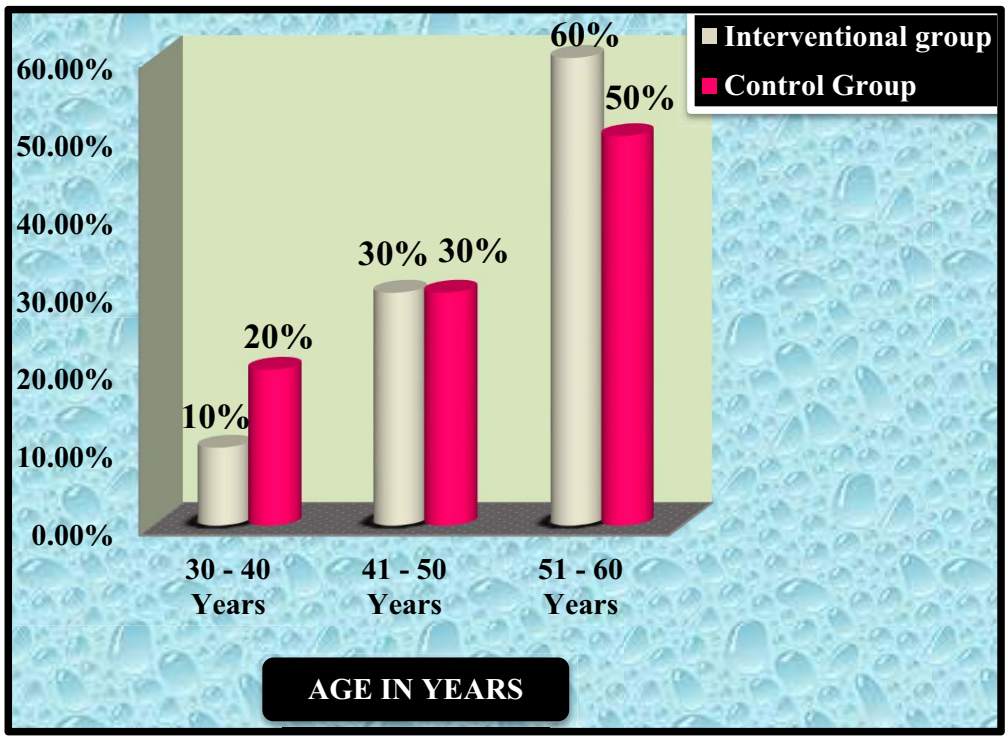

Figure 4.1.1 Distribution of patients according to their Age in interventional and control group

The above figure 4.1.1 shows that in interventional group, 18 (60%) patients were between the age group of 51 to 60 years, 9 (30%) patients were between the age group of 41 to 50 years and 3 (10%) patients were between 30 to 40 years.

In control group, 15 (50%) patients were between 51 to 60 years, 9 (30%) patients were between 41 to 50 years, 6 (20%) patients belong to the age group of 30 to 40 years.

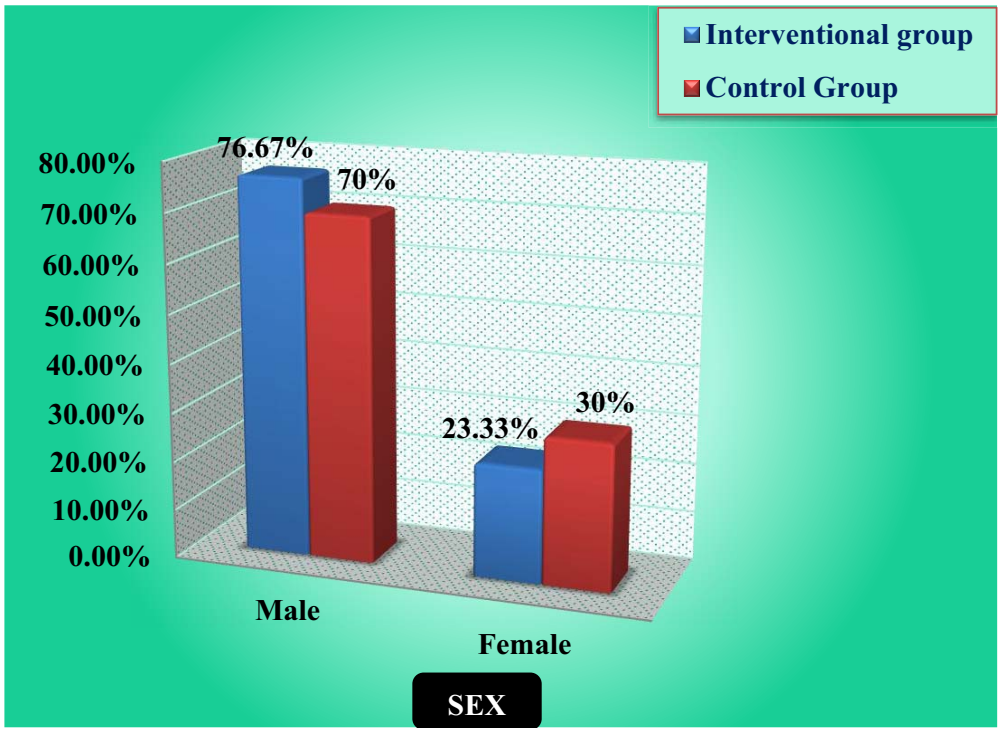

Figure 4.1.2 Distribution of patients according to their Sex in interventional group and control group

The above figure 4.1.2 shows that, in interventional group majority of the patients 23 (76.67%) were male and 7 (23.33%) were female.

In control group, most of the patients 21 (70%) were male and 9 (30%) patients were female.

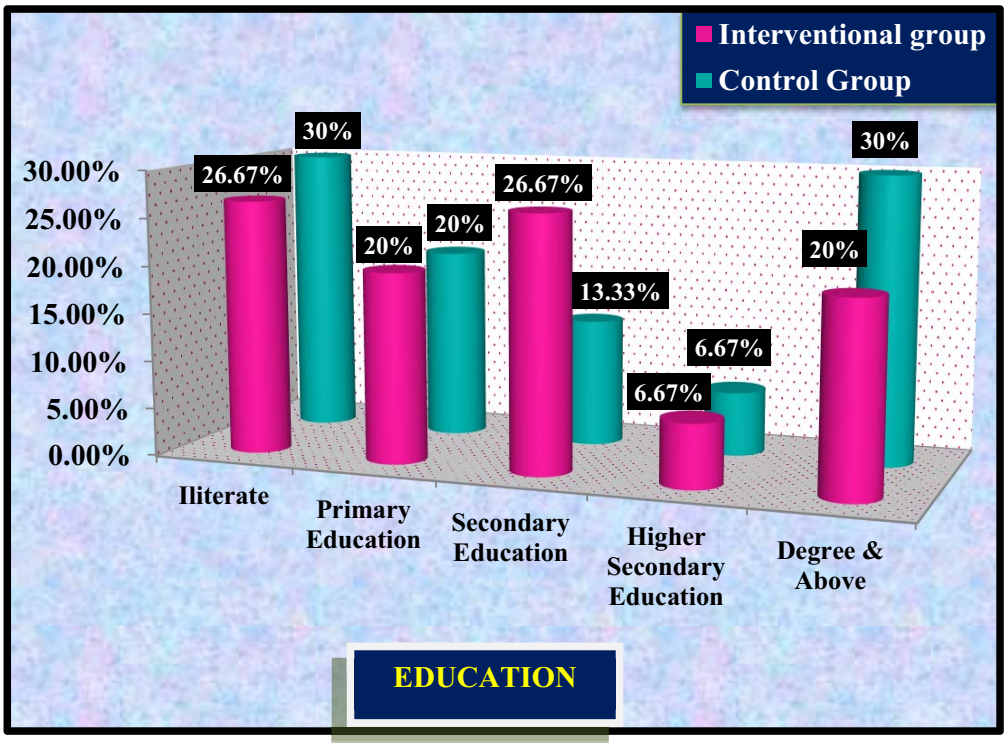

Figure 4.1.3 Distribution of patients according to their Education in interventional group and control group

The above figure 4.1.3 depicts that in interventional group, 8 (26.67%) patients were illiterate, 8 (26.67%) patients had secondary education, 6 (20%) patients had primary education and degree and above respectively and 2 (6.66%) patients had higher secondary education.

In control group, 9 (30%) patients were illiterate and had degree and above respectively, 6 (20%) patients completed primary education, 4 (13.33%) patients had secondary education and 2 (6.67%) patients had higher secondary education.

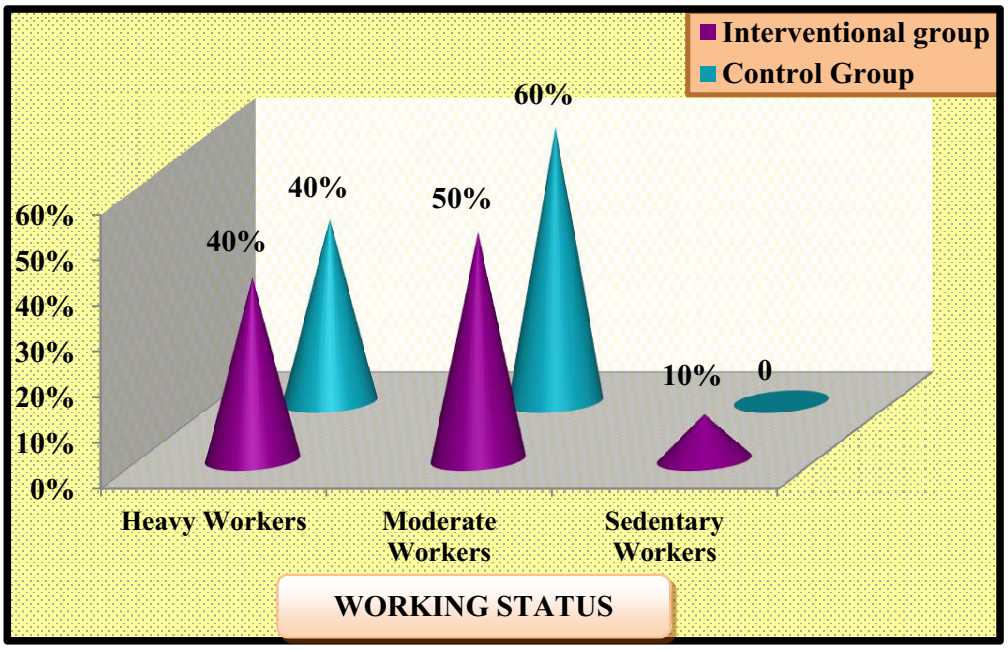

Figure 4.1.4 Distribution of patients according to their Working Status in interventional group and control group

The above figure 4.1.4 shows that in interventional group, half of the patients 15 (50%) were moderate workers, 12 (40%) patients were heavy workers and 3 (10%) patients were sedentary workers.

In control group, more than half of the 18 (60%) patients were moderate workers, 12 (40%) patients were heavy workers and no patients were sedentary workers.

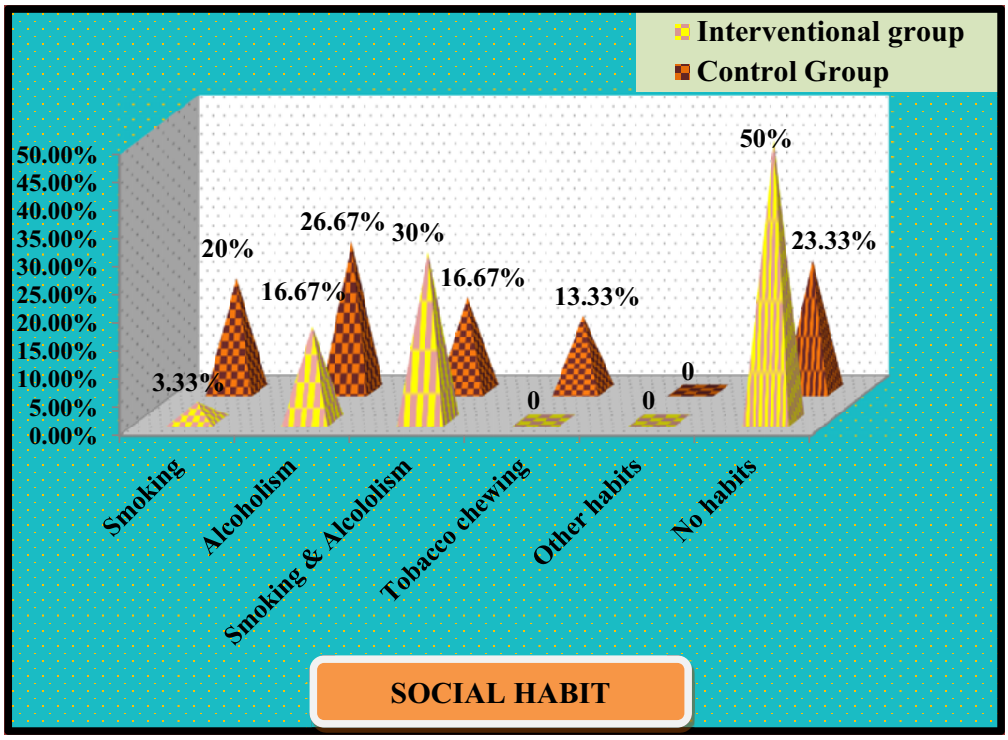

Figure 4.1.5 Distribution of patients according to their Social Habit in interventional group and control group

The above figure 4.1.5 shows that in interventional group, 9 (30%) patients were smokers and alcoholic, 5 (16.67%) patients were alcoholic and 1 (3.33%) patient had smoking habit whereas 15 (50%) patients had no habits.

In control group, 8 (26.67%) patients were alcoholic, 6 (20%) patients were smokers, 4 (13.33%) patients had the habit of tobacco chewing and 7 (23.33%) patients had no habits.

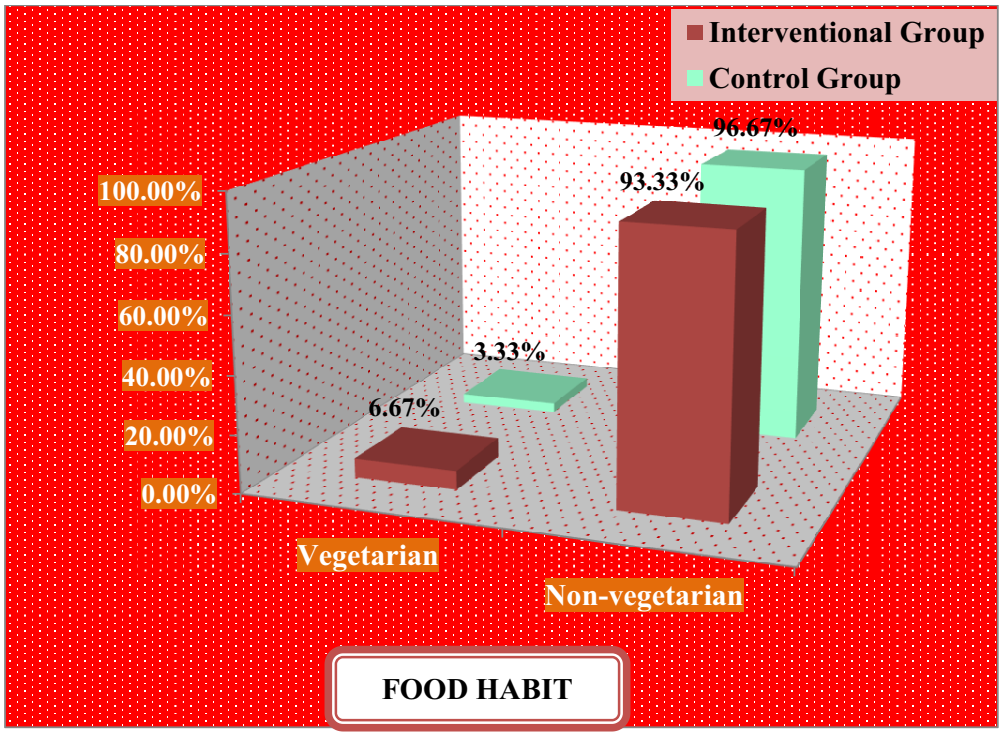

Figure 4.1.6 Distribution of patients according to their Food Habit in interventional group and control group

The above figure 4.1.6 shows that in interventional group, most of the patients 28 (93.33%) were non-vegetarian and 2 (6.67%) patients were vegetarian.

In control group, most of the patients 29 (96.67%) were non-vegetarian and 1 (3.33%) patient was vegetarian.

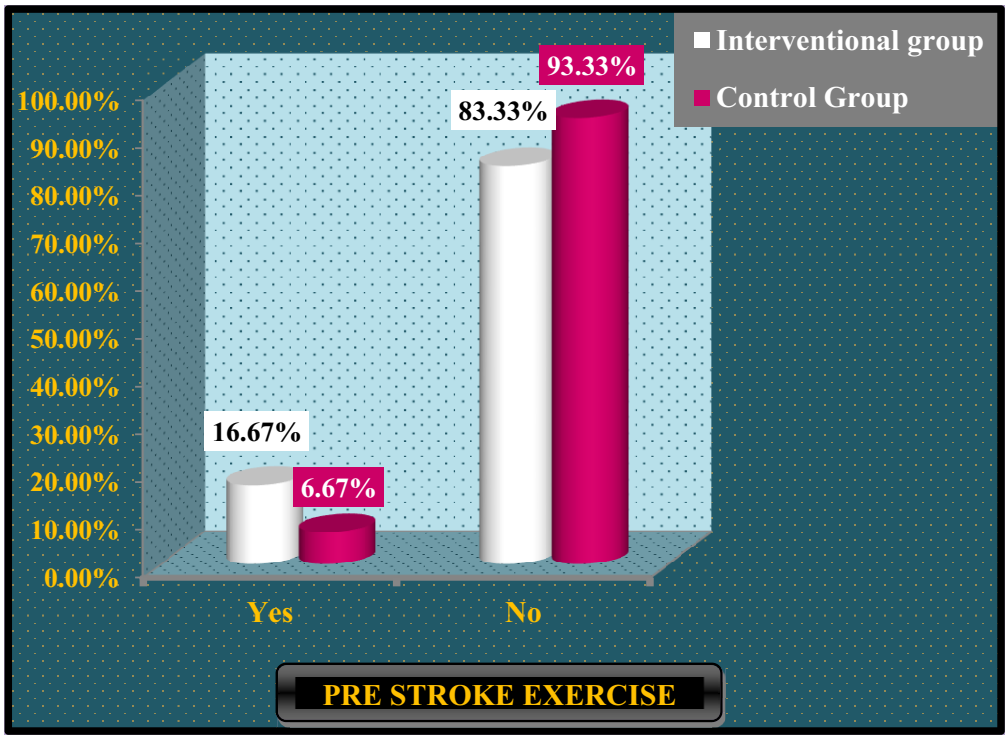

Figure 4.1.7 Distribution of patients according to their Pre Stroke Exercise in interventional group and control group

The above figure 4.1.7 shows that in interventional group, most of the patients 25 (83.33%) were not practiced pre stroke exercise and 5 (16.67%) patients were practiced pre stroke exercise.

In control group, majority of the patients 28 (93.33%) were not practiced pre stroke exercise and 2 (6.67%) patients were practiced pre stroke exercise.

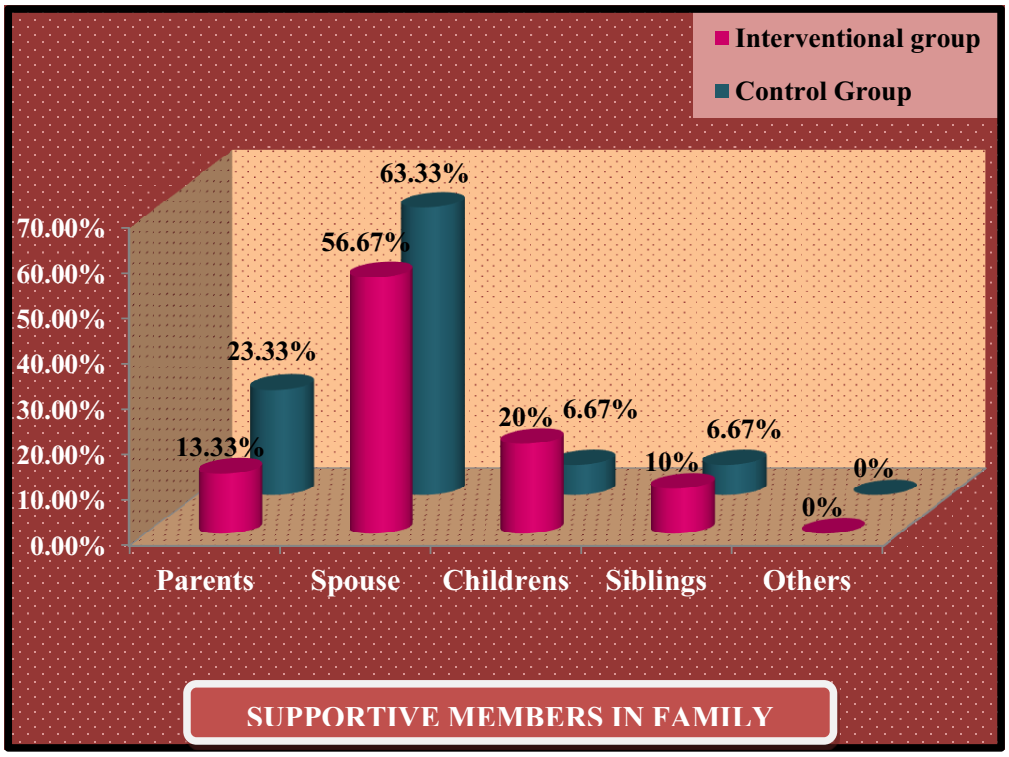

Figure 4.1.8 Distribution of patients according to Supportive Members in their Family in interventional group and control group

The above figure 4.1.8 shows that in interventional group, majority of the patients 17 (56.67%) were supported by their spouse, 6 (20%) patients were getting support from their children, 4 (13.33%) patients were supported by their parents and 3 (10%) patients were supported by siblings.

In control group, most of the patients 19 (63.33%) were supported by their spouse, 7 (23.33%) patients were supported by their parents, 2 (6.67%) patients were getting support from their children and 2 (6.67%) patients were supported by their siblings.

4.2 Distribution of patients according to their clinical variables in Interventional and Control group

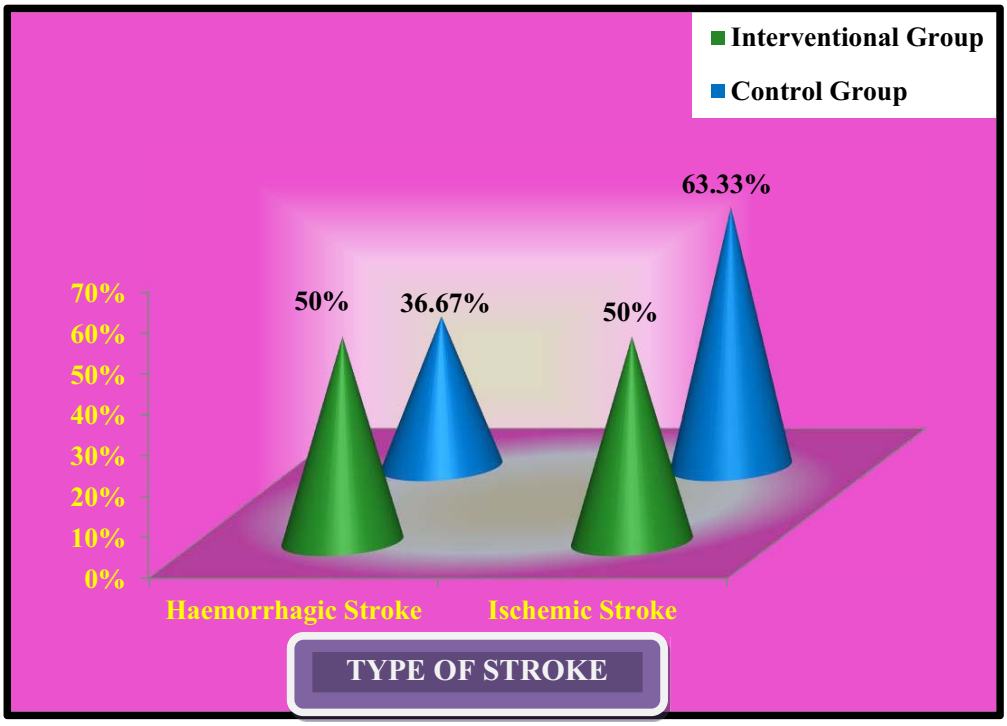

Figure 4.2.1 Distribution of patients according to their Type of Stroke in interventional group and control group

The above figure 4.2.1 shows that in interventional group, half of the 15 (50%) patients had hemorrhagic stroke and 15 (50%) patients had ischemic stroke.

In control group, most of the 19 (63.33%) patients had ischemic stroke and 11 (36.67%) patients had hemorrhagic stroke.

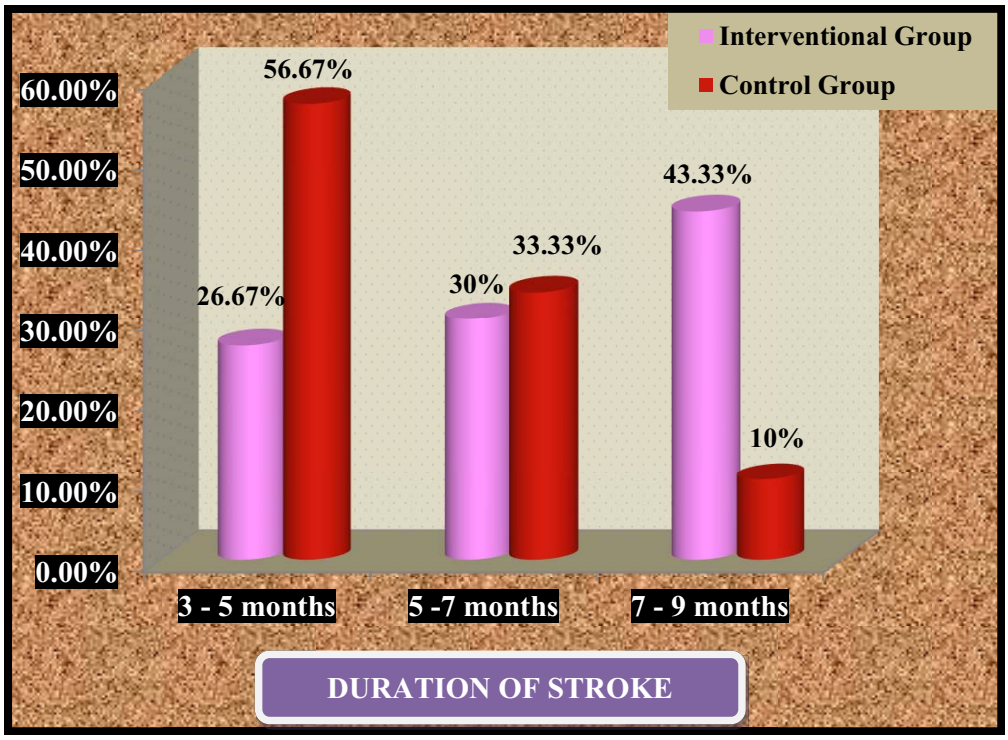

Figure 4.2.2 Distribution of patients according to their Duration of Stroke in interventional group and control group

The above figure 4.2.2 shows that in interventional group, nearly half of the patients 13 (43.33%) had stroke for the past 7 - 9 months, 9 (30%) patients had stroke for the past 5 - 7 months and 8 (26.67%) patients had stroke for the past 3 - 5 months.

In control group, most of the patients 17 (56.67%) had stroke for the past 3 - 5 months, 10 (33.33%) patients had stroke for the past 5 - 7 months and 3 (10%) patients had stroke for the past 7 - 9 months.

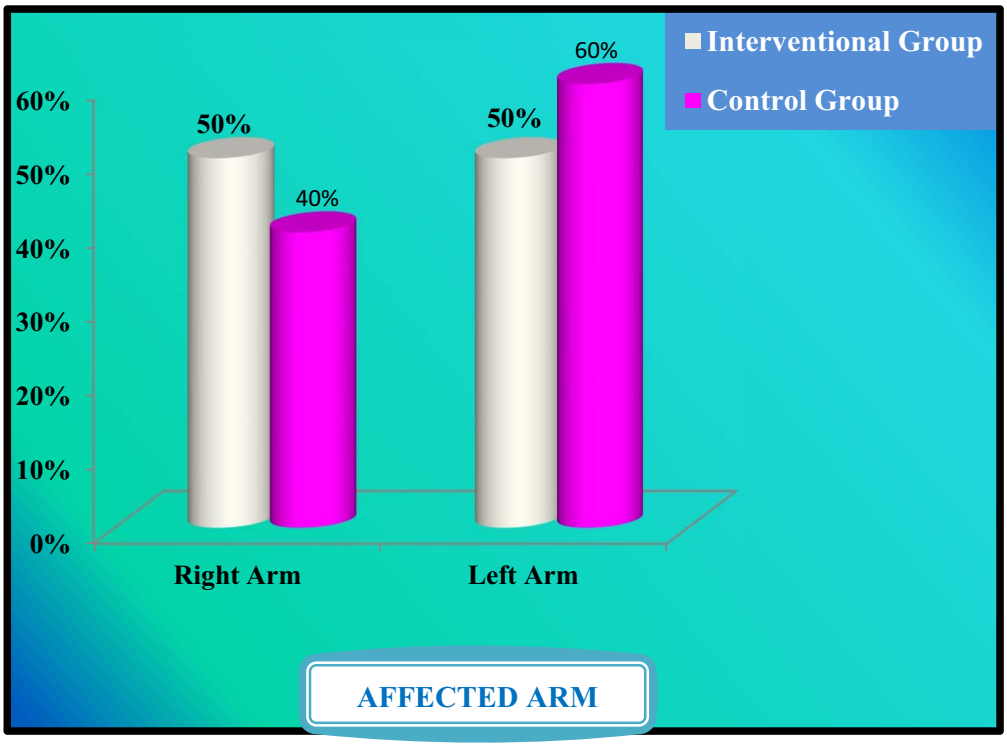

Figure 4.2.3 Distribution of patients according to their Affected Arm in interventional group and Control group

The above figure 4.2.3 depicts that in interventional group, half of the patients 15 (50%) had hemiparesis in the right arm and remaining 15 (50%) patients had hemiparesis in the left arm.

In control group, more than half of the patients 18 (60%) had hemiparesis in the left arm and 12 (40%) patients had hemiparesis in the right arm.

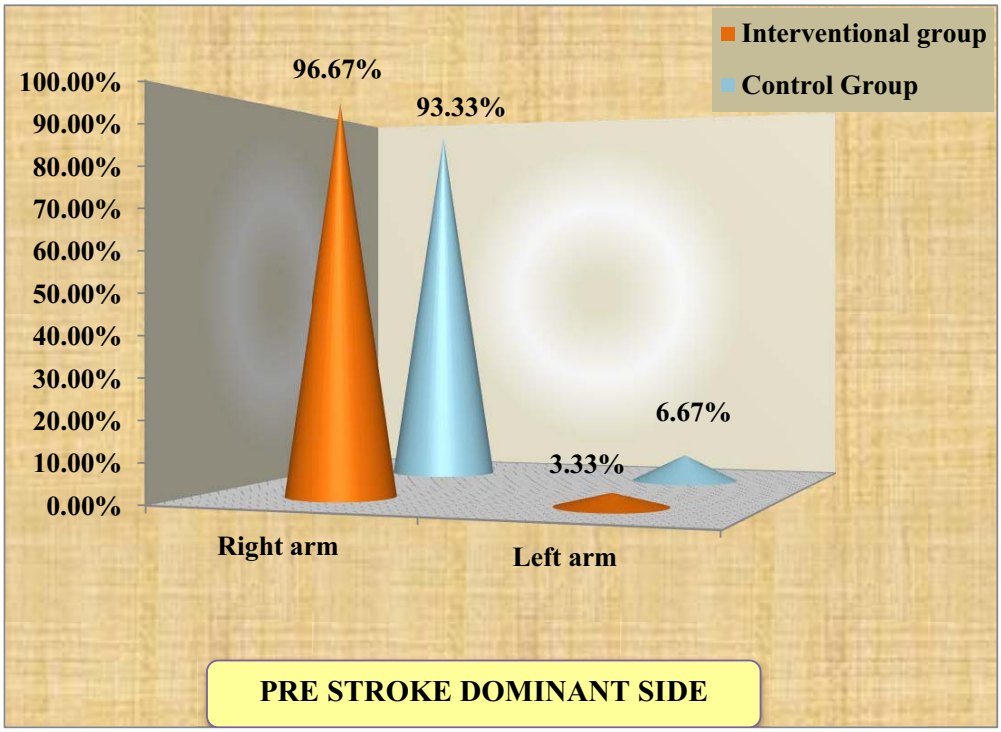

Figure 4.2.4 Distribution of patients according to their Pre Stroke Dominant Side in interventional group and control group

The above figure 4.2.4 shows that in interventional group, majority of the patients 29 (96.67%) had used right arm as a dominant side and remaining 1 (3.33%) patient had left arm as his dominant side.

In control group, majority of the patients 28 (93.33%) had used right arm as a dominant side and 2 (6.67%) patients had left arm as their dominant side.

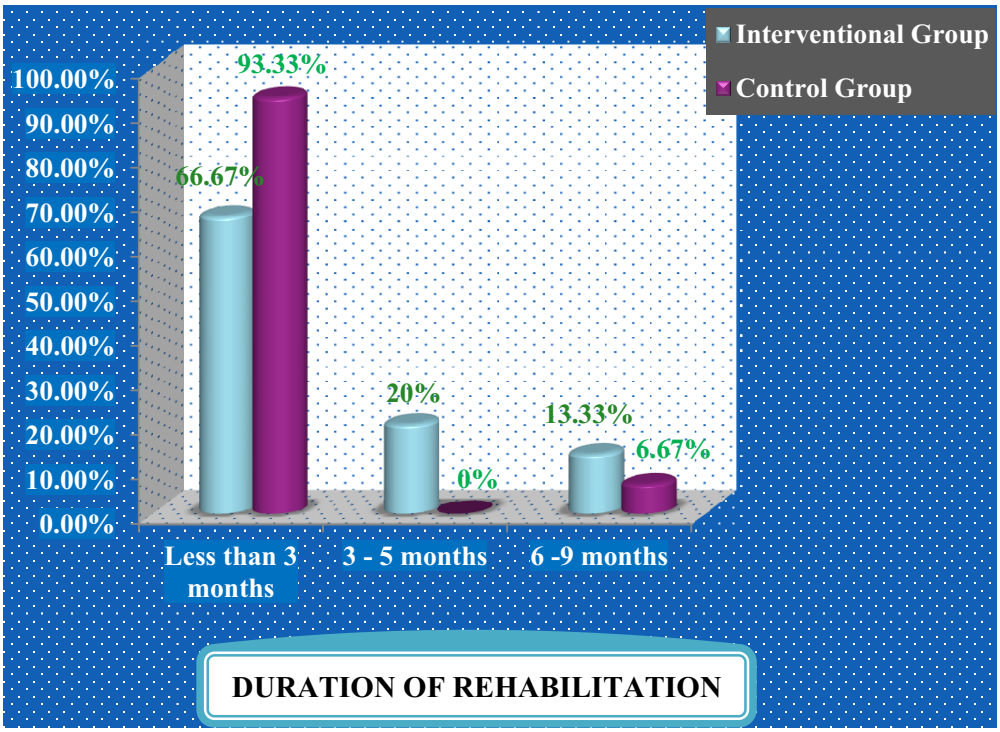

Figure 4.2.5 Distribution of patients according to their Duration of Rehabilitation in interventional group and control group

The above figure 4.2.5 reveals that in interventional group, most of the patients 20 (66.67%) had received rehabilitation for less than 3 months, 6 (20%) patients had received rehabilitation between 3 - 5 months and remaining 4 (13.33%) patients had under gone rehabilitation between 6 - 9 months.

In control group, majority of the patients 28 (93.33%) had received rehabilitation less than 3 months, 2 (6.67%) patients had received rehabilitation between 6 - 9 month and none of them had undergone rehabilitation between 3 - 5 months.

SECTION B

Assess the level of upper extremity function among patients in interventional and control group

Table 4.3.1 Frequency and percentage distribution on level of motor arm function among patients in interventional and control group

n = 60

Level of motor arm function	Interventional Group n=30				Control Group n=30			
	Pre-test		Post-test		Pre-test		Post-test	
	f	p (%)	f	p (%)	f	p (%)	f	P (%)
Never	0	0	0	0	0	0	0	0
Very poor	26	86.67	18	60	26	86.67	25	83.34
Poor	3	10	10	33.34	4	13.33	4	13.33
Fair	1	3.33	1	3.33	0	0	1	3.33
Almost normal	0	0	1	3.33	0	0	0	0
Normal	0	0	0	0	0	0	0	0

The above table 4.3.1 shows that in pre-test most of the 26 (86.67%) patients had very poor motor arm function, 3 (10%) patients had poor motor arm function and 1 (3.33%) patient had fair motor arm function in interventional group. In post-test most of the 18 (60%) patients had very poor motor arm function, 10 (33.34%) patients had poor motor arm function, 1 (3.33%) patient had fair and almost normal motor arm function.

In control group most of the 26 (86.67%) patients had very poor motor arm function and 4 (13.33%) patients had poor motor arm function in pre-test. 25 (83.34%) patients had very poor motor arm function, 4 (13.33%) patients had poor motor arm function and 1 (3.33%) patient had fair motor arm function in post-test.

Table 4.3.2 Frequency and percentage distribution on level of hand grip function among patients in interventional and control group

n=60

Level of hand grip function	Interventional Group n=30				Control Group n=30			
	Pre-test		Post-test		Pre-test		Post-test	
	f	p (%)	f	P (%)	f	p (%)	f	P (%)
Never	0	0	0	0	0	0	0	0
Very poor	26	86.67	15	50	28	93.33	22	73.33
Poor	3	10	13	43.33	2	6.67	8	26.67
Fair	1	3.33	2	6.67	0	0	0	0
Almost normal	0	0	0	0	0	0	0	0
Normal	0	0	0	0	0	0	0	0

The above table 4.3.2 shows that in interventional group most of the 26 (86.67%) patients had very poor hand grip function, 3 (10%) patients had poor hand grip function and 1 (3.33%) patient had fair hand grip function in pre-test. Half of the 15 (50%) patients had very poor hand grip function, 13 (43.33%) patients had poor hand grip function and 2 (6.67%) patients had fair hand grip function in post-test.

In control group most of the 28 (93.33%) patients had very poor hand grip function and 2 (6.67%) patients had poor hand grip function in pre-test. 22 (73.33%) patients had very poor hand grip function and 8 (26.67%) patients had poor hand grip function in post-test.

SECTION C

Comparison of mean Pre-test and Post-test scores on level of upper extremity function among patients in interventional and control group

Table 4.4 Mean, Standard Deviation and Mean difference in Pre and Post-test scores among patients in interventional and control group

n=60

Groups	Level of Upper Extremity Function	Pre test		Post test		Mean difference
		Mean	SD	Mean	SD	
Interventional group n=30	Motor arm function	21.80	13.38	32.83	15.77	11.03
	Hand grip function	6.20	4.80	10.87	4.78	4.67
Control group n=30	Motor arm function	19.33	10.45	22.93	10.37	3.60
	Hand grip function	5.43	7.04	7.76	6.77	2.33

The above table 4.4 shows the comparison of mean and standard deviation of pre and post test scores among interventional and control group. In Pre-test, the mean and standard deviation of motor arm function was 21.80 ± 13.38 in interventional group and 19.33 ± 10.45 in the control group, whereas the mean and standard deviation of hand grip function was 6.20 ± 4.80 in interventional group and 5.43 ± 7.04 in the control group.

In Post-test, the mean and standard deviation of motor arm function was 32.83 ± 15.77 in the interventional group and 22.93 ± 10.37 in the control group, whereas the mean and standard deviation of hand grip function was 10.87 ± 4.78 in the interventional group and 7.76 ± 6.77 in the control group.

The mean difference of motor arm function was 11.03 and 3.60 and hand grip function was 4.67 and 2.33 in interventional and control group respectively.

SECTION D

Testing Hypothesis

a. Effectiveness of modified constraint induced movement therapy on level of upper extremity function among post stroke hemiparetic patients in the interventional group

Table 4.5 Paired 't' test value of pre and post-test score on level of upper extremity function among interventional group

n=30

Interventional group		Mean	SD	Paired 't' Value	Df
Motor Arm function	Pre-test	21.80	13.38	**12.67	29
	Post-test	32.83	15.77		
Hand Grip function	Pre-test	6.20	4.80	**16.62	
	Post-test	10.87	4.78		

Table value = 2.46 ****Highly Significant at p ≤ 0.01**

The above table 4.5 portraits, the calculated paired 't' test value of motor arm function 12.67 was greater than the table value 2.46 at $p \leq 0.01$. The calculated paired 't' value of hand grip function 16.62 was greater than the table value 2.46 which was highly significant at $p \leq 0.01$. It reveals that the modified constraint induced movement therapy was effective in improving upper extremity function among post stroke hemiparetic patients. Hence, the hypothesis H_1 is retained.

b. Effectiveness of modified constraint induced movement therapy on level of upper extremity function among patients in interventional and control group

Table 4.6 Unpaired 't' test value of post-test scores on level of upper extremity function among interventional and control group

n=60

Level of upper extremity function	Groups	Mean	SD	Unpaired 't' value	df
Motor Arm function	**Interventional group**	32.83	15.77	**2.82	58
	Control group	22.93	10.37		
Hand Grip function	**Interventional group**	10.87	4.78	**4.18	
	Control group	7.76	6.77		

Table value =2.39 ****Highly Significant p ≤ 0.01**

The above table 4.6 depicts that the calculated unpaired 't' test value of motor arm function 2.82 was greater than the table value 2.39 at $p \leq 0.01$. The calculated unpaired 't' value of hand grip function 4.18 was greater than the table value 2.39 which was highly significant at $p \leq 0.01$. Hence it shows that the modified constraint induced movement therapy was effective in improving level of upper extremity function for post stroke hemiparetic patients. Hence, the hypothesis H_2 is retained.

c. Association between the level of upper extremity function among patients and their selected demographic variables in interventional group.

Table 4.7.1 Association between the pre and post test scores on level of upper extremity function among patients and their selected demographic variables in the interventional group.

n=30

S.No	Demographic variables	Interventional group											
		Motor Arm function						Hand Grip function					
		Pre-test			Post-test			Pre-test			Post-test		
		df	$\chi 2$ value	Table value	df	$\chi 2$ value	Table value	df	$\chi 2$ value	Table value	df	$\chi 2$ value	Table value
1.	Age	4	1.09	9.49	6	4.02	12.59	4	2.82	9.49	4	6.01	9.49
2.	Sex	2	0.46	5.99	3	2.61	7.82	2	1.40	5.99	2	0.71	5.99
3.	Education	8	6.68	15.51	12	9.82	21.03	8	6.54	15.51	8	6.74	15.51
4.	Working status	4	**13.23***	9.49	6	**17.41***	12.59	4	**10.23***	9.49	4	**11.05***	9.49
5.	Social habit	6	4.05	12.59	9	8.31	16.92	6	4.03	12.59	6	8.50	12.59
6.	Food habit	2	0.33	5.99	3	0.36	7.82	2	0.33	5.99	2	2.78	5.99
7.	Prestroke exercise	2	0.84	5.99	3	1.13	7.82	2	0.83	5.99	2	3.09	5.99
8.	Supportive members in family	6	**10.25***	12.59	9	**17.56***	16.92	6	7.74	12.59	6	12.23	12.59

***Significant at P ≤ 0.05**

The table 4.7.1 displays that in the interventional group, with regard to motor arm function there was a significant association found between working status and supportive members in the family whereas age, sex, education, social habit, food habit and pre stroke exercise were not associated at $p \leq 0.05$.

In hand grip function, working status was found to be associated in post test score. Age, sex, education, social habit, food habit, pre stroke exercise and supportive members in family were not associated at $p \leq 0.05$.

Hence, the hypothesis H_3 is accepted for the above mentioned variables such as working status and supportive members in family and rejected for age, sex, education, social habit, food habit and pre stroke exercise.

Table 4.7.2 Association between the pre and post-test scores on level of upper extremity function among patients and their selected clinical variables in the interventional group.

n=30

S. No	Clinical variables	Interventional group											
		Motor arm function						Hand grip function					
		Pre-test			Post-test			Pre-test			Post-test		
		df	χ^2 value	Table value	df	χ^2 value	Table value	df	χ^2 value	Table value	df	χ^2 value	Table value
1.	Type of stroke	2	1.33	5.99	3	4.49	7.81	2	1.33	5.99	2	2.14	5.99
2.	Duration of stroke	4	3.77	9.49	6	**16.50***	12.59	4	3.77	9.49	4	**11.06***	9.49
3.	Affected arm	2	1.49	5.99	3	2.40	7.81	2	1.49	5.99	2	2.27	5.99
4.	Prestroke dominant side	2	0.15	5.99	3	2.09	7.81	2	0.15	5.99	2	1.37	5.99
5.	Duration of rehabilitation	4	5.04	9.49	6	**14.10***	12.59	4	6.17	9.49	4	**11.64***	9.49

***Significant at $P \leq 0.05$**

The table 4.7.2 displays that in the interventional group, with regard to motor arm function there was a significant association found between duration of stroke and duration of rehabilitation whereas type of stroke, affected arm and prestroke dominant side were not associated at $p \leq 0.05$.

In hand grip function duration of stroke and duration of rehabilitation was found to be associated in post test score. Type of stroke, affected arm and prestroke dominant side were not associated at $p \leq 0.05$.

Hence, the hypothesis H_3 is accepted for the above mentioned clinical variables such as duration of stroke and duration of rehabilitation and rejected for type of stroke, affected arm and prestroke dominant side.

Summary

This chapter dealt with data analysis and interpretation in the form of statistical value based on the objectives. Paired and unpaired‘t’ test was used to evaluate the effectiveness of modified constraint induced movement therapy on level of upper extremity function. Chi square test was used to find out the association between the pre and post-test level of upper extremity function among post stroke hemiparetic patients with selected demographic and clinical variables in interventional group.

CHAPTER V
DISCUSSION

The purpose of the study was to evaluate the effectiveness of modified constraint induced movement therapy on level of upper extremity function among post stroke hemiparetic patients at selected Rehabilitation Centers, Coimbatore. This chapter presents the main findings and its discussion. This research study has been discussed on the objectives and the following supported studies.

The discussion of the present study is based on the findings obtained from statistical analysis of collected data. Paired-'t' test was used to test the difference between pre-test and post test results. Unpaired 't' test was used to compare the effectiveness of modified constraint induced movement therapy in improving upper extremity function among samples. "Chi Square" was used to find out the association between the level of upper extremity function with selected demographic and clinical variable.

Distribution of patients according to their demographic and clinical variables

Demographic variables:

In interventional group among 30 patients, 18 (60%) were between the age group of 51 to 60 years, 9 (30%) were between the age group of 41 to 50 years and 3 (10%) patients were between 30 to 40 years, majority of the patients 23 (76.67%) were male and 7 (23.33%) were female, 8 (26.67%) patients were illiterate, 8 (26.67%) patients had secondary education, 6 (20%) patients had primary education and degree and above respectively and 2 (6.67%) patients had higher secondary education, half of the patients 15 (50%) were moderate workers,

12 (40%) patients were heavy workers and 3 (10%) patients were sedentary workers, 9 (30%) patients were smokers and alcoholic, 5 (16.67%) patients were alcoholic and 1 (3.33%) patient had smoking habit whereas 15 (50%) patients had no habits, most of the patients 28 (93.33%) were belongs to non-vegetarian and 2 (6.66%) patients were vegetarian, most of the patients 25 (83.33%) were not practiced pre stroke exercise and 5 (16.67%) patients were practiced pre stroke exercise, majority of the 17 (56.67%) patients were supported by their spouse, 6 (20%) patients were getting support from their children, 4 (13.33%) patients were supported by their parents and 3 (10%) patients were supported by siblings.

In control group, 15 (50%) patients were between 51 to 60 years, 9 (30%) patients were between 41 to 50 years, 6 (20%) patients were belongs to the age group of 30 to 40 years, most of the patients 21 (70%) were male 9 (30%) were female, 9 (30%) patients were illiterate and had degree and above respectively, 6 (20%) patients completed primary education, 4 (13.33%) had secondary education and 2 (6.67%) had higher secondary education, more than half of the 18 (60%) patients were moderate workers, 12 (40%) patients were heavy workers and no patients were in sedentary workers, 8 (26.67%) patients were alcoholic, 6 (20%) patients were smokers, 4 (13.33%) patients had the habit of tobacco chewing and 7 (23.33%) patients had none of the above habits, almost all the patients 29 (96.67%) were non-vegetarian and 1 (3.33%) patient was vegetarian, most of the patients 28 (93.33%) were not practiced pre stroke exercise and 2 (6.67%) patients were practiced pre stroke exercise, most of the 19 (63.33%) patients were supported by their spouse, 7 (23.33%) patients were supported by their parents, 2 (6.67%) patients were getting support from their children and 2 (6.67%) patients were supported by their sibling.

Clinical variables:

In interventional group, 15 (50%) patients had hemorrhagic stroke and 15 (50%) patients had ischemic stroke, nearly half of the patients 13 (43.33%) had stroke between 7 - 9 months, 9 (30%) patients had stroke between 5 - 7 months and 8 (26.67%) patients had stroke between 3 - 5 months, half of the patients 15 (50%) had stroke in the right arm and 15 (50%) patients had stroke in the left arm, majority of the patients 29 (96.67%) had used right arm as a dominant side and remaining 1 (3.33%) patient had left arm as his dominant side, most of the patients 20 (66.67%) had received rehabilitation for less than 3 months, 6 (20%) patients had received rehabilitation for 3 - 5 months and 4 (13.33%) patients had under gone rehabilitation between 6 - 9 months.

In control group, 19 (63.33%) patients had ischemic stroke and (36.67%) patients had hemorrhagic stroke, more than half of the patients 17 (56.67%) had stroke for the past 3 - 5 months, 10 (33.33%) patients had stroke for the past 5 - 7 months and 3 (10%) patients had stroke for the past 7 - 9 month, more than half of the patients 18 (60%) had stroke in the left arm and 12 (40%) patients had stroke in the right arm, majority of the patients 28 (93.33%) had used right arm as a dominant side and 2 (6.67%) patients had left arm as their dominant side, majority of the patients 28 (93.33%) were received rehabilitation less than 3 months and 2 (6.67%) patients were received rehabilitation for 6 - 9 months.

The first objective was to assess the level of upper extremity among post stroke hemiparetic patients in interventional and control group.

In pre-test most of the 26 (86.67%) patients had very poor motor arm function, 3 (10%) patients had poor motor arm function and 1 (3.33%) patient had fair motor arm function in interventional group. In post-test most of the 18 (60%) patients had very poor motor arm function, 10 (33.34%) patients had poor motor arm function, 1 (3.33%) patient had fair motor arm function and 1 (3.33%) patient had almost normal motor arm function. In control group most of the 26 (86.67%) patients had very poor motor arm function and 4 (13.33%) patients had poor motor arm function in pre-test. 25 (83.34%) patients had very poor motor arm function, 4 (13.33%) patients had poor motor arm function and 1 (3.33%) patient had fair motor arm function in post-test.

In interventional group most of the 26 (86.67%) patients had very poor hand grip function, 3 (10%) patients had poor hand grip function and 1 (3.33%) patient had fair hand grip function in pre-test. Half of the 15 (50%) patients had very poor hand grip function, 13 (43.33%) patients had poor hand grip function and 2 (6.67%) patients had fair hand grip function in post-test. In control group most of the 28 (93.33%) patients had very poor hand grip function and 2 (6.67%) patients had poor hand grip function in pre-test. 22 (73.33%) patients had very poor hand grip function and 8 (26.67%) patients had poor hand grip function in post-test.

The comparison of mean pre and post-test scores on level of upper extremity function among patients in interventional and control group. In Pre-test the mean and standard deviation of motor arm function was 21.80 ± 13.38 in the

interventional group and 19.33 ± 10.45 in the control group; whereas the mean and standard deviation of hand grip function was 6.20 ± 4.80 in interventional group and 5.43 ± 7.04 in the control group. In Post-test the mean and standard deviation of motor arm function was 32.83 ± 15.77 in the interventional group and 22.93 ± 10.37 in the control group whereas the mean and standard deviation of hand grip function was 10.87 ± 4.78 in the interventional group and 7.76 ± 6.77 in the control group. The mean difference of Motor Arm function was 11.03 and 3.60 and hand grip function was 4.67 and 2.33 in interventional and control group respectively.

Priyanka Singh and Bijayeta Pradhan (2012) conducted a randomized control trail to assess the effectiveness of mCIMT in 40 stroke patients [mCIMT (n=20) and control group (n=20)] at Sikkim. In interventional group, a mitt was used to restrain the unaffected arm for 10 hours/day for 2 weeks to perform daily activities except for activities like, toileting, washing etc. The shaping technique was given for 2hours/day for 2 weeks at a frequency of 5 days a week. The control groups were received standard physical therapy for same duration. Wolf Motor Function Test (WMFT), Fugl Meyer Assessment (FMA) were used to measure outcomes. The pre-test score for WMFT in interventional group was 28.04 ± 6.58 and post-test score was 13.59 ± 2.86 (p=0.003). In control group, the pre-test score was 29.59 ± 5.84 and after 2 weeks of conventional therapy, it was 22 ± 4.68 (p=0.00). In interventional group, the pre-test score of FMA was 31.15 ± 6.37 and after 2 weeks of intervention it was 55.7 ± 6.4 (p=0.0). In control group, pre-test score was 29.3 ± 6.10 and post-test score was 39.1 ± 6.4 after 2 weeks (p=0.0). The difference of WMFT in interventional group was 14.75 ± 4.83 and in control

group it was 7.21 ± 2.01. In intervention group, the difference of FMA was 24.95 ± 3.74 and in control group it was 9.5 ± 2.7. So, the results indicate that mCIMT is improving the function of the affected upper extremity in stroke subjects.

The second objective was to evaluate the effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on level of upper extremity function among post stroke hemiparetic patients.

In interventional group, overall score on level of upper extremity function among patients in mean pre-test and post-test scores revealed that, motor arm function 32.83 ± 15.77 was higher than pre-test mean 21.80 ± 13.38 in the interventional group. In post-test mean hand grip function 10.87 ± 4.78 was greater than pre-test mean 6.2 ± 4.80. The calculated paired 't' test value of motor arm function 12.67 was greater than the table value 2.46 at $p \leq 0.01$. The calculated paired 't' value of hand grip function 16.62 was greater than the table value 2.46 which was highly significant at $p \leq 0.01$.It reveals that the modified Constraint Induced Movement Therapy was effective in improving upper extremity function among post stroke hemiparetic patients. Hence, the hypothesis H_1 is retained.

The mean post-test value of motor arm function was 32.83 ± 15.77 and 22.93 ± 10.37 in the interventional and control group respectively. The mean post-test value of hand grip function was 10.87 ± 4.78 and 7.76 ± 6.77 in the interventional and control group respectively. The calculated unpaired 't' values for motor arm function and hand grip function in interventional and control group were 2.82 and 4.18 respectively. These values were greater than the table

value 2.39 which was highly significant at $p \leq 0.01$. It shows that the modified Constraint Induced Movement Therapy was effective in improving level of upper extremity function for post stroke hemiparetic patients. Hence, the hypothesis H_2 is retained.

Page SJ, Sisto SA et al (2004) conducted an experimental study on efficacy of mCIMT among 17 chronic stroke patients. 7 patients received structured therapy to emphasize more affected arm use in valued activities, 3 times a week for 10 weeks. Their less affected arm was restrained 5days per week for 5 hours. 4 patients were received regular therapy with similar time. 6 patients received no therapy. The Fugl-Meyer Assessment of Motor Recovery (FMA), Action Research Arm (ARA) Test and Motor Activity Log (MAL) scales were used. The mCIMT patients shown greater motor changes on the FMA and ARA (18.4, 11.4) than regular therapy (6.0, 7.1) or control (−2.9, −4.5). Statistical analyses revealed significant differences in motor improvement on the FMA (F2, 12=11.2, P=.002) and the ARA (F2, 12=14.0, P=.001). Results indicated that, when pretreatment motor differences are controlled, mCIMT resulted in substantially higher post treatment FMA and ARA scores. So researchers concluded that mCIMT may be an effective method of improving motor arm functions of chronic stroke patients.

The third objective was to find out the association between the level of upper extremity function among samples and their selected demographic and clinical variables.

Chi-square test was used to identify the influence of selected demographic and clinical variables on level of upper extremity function in the interventional

group. In the interventional group there was a significant association found between working status and supportive members in the family whereas age, sex, education, social habit, food habit and pre stroke exercise were not associated at $p \leq 0.05$ in motor arm function. In hand grip function working status was found to be associated in post test score. Age, sex, education, social habit, food habit, pre stroke exercise and supportive members in family were not associated at $p \leq 0.05$. Hence, the hypothesis H_3 is accepted for the above mentioned variables such as working status and rejected for age, sex, education, social habit, food habit and pre stroke exercise.

In motor arm function there was a significant association found between patients and their selected clinical variables such as duration of stroke and duration of rehabilitation whereas type of stroke, affected arm and pre stroke dominant side were not associated at $p \leq 0.05$ in the interventional group. In hand grip function duration of stroke and duration of rehabilitation was found to be associated in post test score. Type of stroke, affected arm and pre stroke dominant side were not associated at $p \leq 0.05$. Hence, the hypothesis H_3 is accepted for the above mentioned clinical variables such as duration of stroke and duration of rehabilitation and rejected for type of stroke, affected arm and pre stroke dominant side.

Summary

This chapter dealt with the discussion of the study with the reference to the objectives and supportive studies. All the three objectives have been achieved and three hypotheses were tested.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter presents the summary of the study and conclusion drawn. It clarifies the limitation of the study, the implications and the recommendation in different areas like nursing practice, nursing research, nursing education, nursing administration and recommendation for further research.

Summary of the Study

Stroke is a life changing event that affects not only the person who may be disabled, but their family and caregivers. Upper extremity motor deficits after stroke are more common. There is a strong relationship between upper extremity function and ability to perform activities of daily living; social and recreational activities have been found. In stroke rehabilitation mCIMT is a form of active rehabilitation therapy that enhances use of affected upper extremity function in stroke patients.

The investigator conducted a study to evaluate the effectiveness of modified constraint induced movement therapy (mCIMT) on level of upper extremity function among post stroke hemiparetic patients in selected rehabilitation centers in Coimbatore, during the year 2015.

The research approach used in the study was quantitative evaluative approach. The quasi experimental pre-test post-test control group design and non-probability purposive sampling technique was used to select 60 post stroke hemiparetic patients (30 patients in interventional group; 30 patients in control group). The study was conducted in Global neuro rehabilitation center, Seesha rehabilitation center and Sivasakthi hi-tech physiotherapy center. The conceptual

framework developed for the study was based on modified Wiedenbech's Helping Art of Clinical Nursing (1964). A Demographic and clinical variables, Motor Activity Log (MAL) and modified Sollerman hand grip function scale with observation checklist were used to collect data based on the study objectives. The content validity and reliability was obtained prior to the study. Subsequently a pilot study was found that the tool and technique was feasible and practicable.

The data collection was done for a period of 4 weeks. Prior to the data collection, the investigator explained the nature of the study and obtained written consent from the patients. The demographic and clinical variables were collected from the patients. Pre-test level of upper extremity function was assessed through motor activity log and modified Sollerman hand grip function scale with observation checklist, among interventional group on first day of the study. Followed by, modified constraint induced movement therapy was demonstrated and the patients were made to practice the same for 14 consecutive days in Global neuro rehabilitation center and post-test was conducted on 14^{th} day. The same was repeated in Seesha rehabilitation center, Coimbatore for 14 consecutive days and post-test was done on 14^{th} day. The non-affected arm of the patients was restrained with splint for 4 hours and affected arm was practiced with repeated activities. The control groups were selected from Sivasakthi hi-tech physiotherapy center. Pre-test was administered and received routine rehabilitation. Post-test was done after 2 weeks. Ethical aspects were considered throughout the study. The data were analyzed by using descriptive and inferential statistics. The overall experience of conducting this study was satisfying as there was good co-operation from patients and their family members, physiotherapist, doctors and nurses. The study was a new experience for the investigator.

Major Findings of the Study

The major findings of the study were summarized as follows

- In interventional group among 30 patients,18 (60%) were between the age group of 51 to 60 years, 9 (30%) patients were between the age group of 41 to 50 years and 3 (10%) patients were between 30 to 40 years, majority of the patients 23 (76.67%) were male and 7 (23.33%) were female, 8 (26.67%) patients were illiterate, 8 (26.67%) patients had secondary education, 6 (20%) patients had primary education and degree and above respectively and 2 (6.66%) patients had higher secondary education, half of the patients 15 (50%) were moderate workers, 12 (40%) patients were heavy workers and 3 (10%) patients were sedentary workers, 9 (30%) patients were smokers and alcoholic, 5 (16.67%) patients were alcoholic and 1 (3.33%) patient had smoking habit whereas 15 (50%) patients had no bad habits, most of the patients 28 (93.33%) belonged to non-vegetarian and 2 (6.67%) patients were vegetarian, most of the patients 25 (83.33%) were not practiced pre stroke exercise and 5 (16.67%) patients were practiced pre stroke exercise, majority of the 17 (56.67%) patients were supported by their spouse, 6 (20%) patients were getting support from their children, 4 (13.33%) patients were supported by their parents and 3 (10%) patients were supported by siblings.
- In interventional group, 15 (50%) patients had hemorrhagic stroke and remaining 15 (50%) patients had ischemic stroke, nearly half of the patients 13 (43.33%) had stroke between 7 - 9 months, 9 (30%) patients had stroke between 5-7 months and remaining 8 (26.67%) patients had stroke between 3-5 months, half of the patients 15 (50%) had stroke in the

right arm and remaining 15 (50%) patients had stroke in the left arm, majority of the patients 29 (96.67%) had used right arm as a dominant side and remaining 1 (3.33%) patient had left arm as their dominant side, most of the patients 20 (66.67%) had received rehabilitation for less than 3 months, 6 (20%) patients had received rehabilitation for 3-5 months and remaining 4 (13.33%) patients had under gone rehabilitation between 6 - 9 months.

- In control group, 15 (50%) patients were between 51 to 60 years, 9 (30%) patients were between 41 to 50 years, 6 (20%) patients belonged to the age group of 30 to 40 years, most of the patients 21 (70%) were male and 9 (30%) were female, 9 (30%) patients were illiterate and had degree and above respectively, 6 (20%) patients completed primary education, 4 (13.33%) had secondary education and 2 (6.67%) had higher secondary education, most of the 18 (60%) patients were moderate workers, 12 (40%) patients were hard workers and no patients were sedentary workers, 8 (26.67%) patients were alcoholic, 6 (20%) patients were smokers, 4 (13.33%) patients had the habit of tobacco chewing and 7 (23.33%) patients had none of the above habits, almost all the patients 29 (96.67%) were non-vegetarian and 1 (3.33%) patient was vegetarian, most of the patients 28 (93.33%) were not practiced pre stroke exercise and 2 (6.67%) patients were practiced pre stroke exercise, most of the 19 (63.33%) patients were supported by their spouse, 7 (23.33%) patients were supported by their parents, 2 (6.67%) patients were getting support from their children and 2 (6.67%) patients were supported by their sibling.

- In control group, 19 (63.33%) patients had ischemic stroke and remaining 11 (36.67%) patients had hemorrhagic stroke, more than half of the patients 17 (56.67%) had stroke for the past 3 - 5 months, 10 (33.33%) patients had stroke for the past 5 - 7 months and remaining 3 (10%) patients had stroke for the past 7 -9 month, more than half of the patients 18 (60%) had stroke in the left arm and 12 (40%) patients had stroke in the right arm, majority of the patients 28 (93.33%) had used right arm as a dominant side and 2 (6.67%) patients had left arm as their dominant side, majority of the patients 28 (93.33%) received rehabilitation less 3 months and 2 (6.67%) patients received rehabilitation for 6 - 9 months.
- In pre-test most of the 26 (86.67%) patients had very poor motor arm function, 3 (10%) patients had poor motor arm function and 1 (3.33%) patient had fair motor arm function in interventional group. In post-test most of the 18 (60%) patients had very poor motor arm function, 10 (33.34%) patients had poor motor arm function, 1 (3.33%) patient had fair and almost normal motor arm function. In control group most of the 26 (86.67%) patients had very poor motor arm function and 4 (13.33%) patients had poor motor arm function in pre-test. 25 (83.34%) patients had very poor motor arm function, 4 (13.33%) patients had poor motor arm function and 1 (3.33%) patient had fair motor arm function in post-test.
- In interventional group most of the 26 (86.67%) patients had very poor hand grip function, 3 (10%) patients had poor hand grip function and 1 (3.33%) patient had fair hand grip function in pre-test. Half of the 15 (50%) patients had very poor hand grip function, 13 (43.33%)

patients had poor hand grip function and 2 (6.67%) patients had fair hand grip function in post-test. In control group most of the 28 (93.33%) patients had very poor hand grip function and 2 (6.67%) patients had poor hand grip function in pre-test. 22 (73.33%) patients had very poor hand grip function and 8 (26.67%) patients had poor hand grip function in post-test.

- In Pre-test, the mean and standard deviation of motor arm function was 21.80 ± 13.38 in the interventional group and 19.33 ± 10.45 in the control group respectively. In Pre-test, the mean and standard deviation of hand grip function was 6.20 ± 4.80 in interventional group and 5.43 ± 7.04 in the control group respectively.
- In Post-test, the mean and standard deviation of motor arm function was 32.83 ± 15.77 in the interventional group and 22.93 ± 10.37 in the control group respectively. In Post-test, the mean and standard deviation of hand grip function was 10.87 ± 4.78 in the interventional group and 7.76 ± 6.77 in the control group respectively. The mean difference of motor arm function was 11.03 and 3.60 and hand grip function was 4.67 and 2.33 in interventional and control group respectively.
- The calculated paired 't' test value of motor arm function 12.67 was greater than the table value 2.46 at $p \leq 0.01$. The calculated paired 't' value of hand grip function 16.62 was greater than the table value 2.46 which was highly significant at $p \leq 0.01$. It revealed that mCIMT was effective in improving upper extremity functions among post stroke hemiparetic patients. Hence, the hypothesis H_1 was retained.

- The calculated unpaired 't' values for motor arm function and hand grip function in interventional and control group were 2.82 and 4.18 respectively. These values were greater than the table value 2.39 at $p \leq 0.01$. It showed that mCIMT was effective in improving level of upper extremity function for post stroke hemiparetic patients. Hence, the hypothesis H_2 was retained.
- In the interventional group there was a significant association found between working status and supportive members in the family whereas age, sex, education, social habit, food habit and pre stroke exercise were not associated in motor arm function at $p \leq 0.05$. In hand grip function working status was found to be associated in post test score. Age, sex, education, social habit, food habit, pre stroke exercise and supportive members in family were not associated at $p \leq 0.05$. Hence, the hypothesis H_3 was accepted for working status and supportive members in family whereas rejected for age, sex, education, social habit, food habit and pre stroke exercise.
- In motor arm function there was a significant association found between patients and their selected clinical variables such as duration of stroke and duration of rehabilitation whereas type of stroke, affected arm and pre stroke dominant side were not associated at $p \leq 0.05$ in the interventional group. In hand grip function also duration of stroke and duration of rehabilitation was found to be associated in post test score. Type of stroke, affected arm and pre stroke dominant side were not associated at $p \leq 0.05$. Hence, the hypothesis H_3 was accepted for the above mentioned clinical variables such as duration of stroke and duration of rehabilitation and rejected for type of stroke, affected arm and pre stroke dominant side.

Conclusion

The study was done to evaluate the effectiveness of modified constraint induced movement therapy among post stroke hemiparetic patients at selected rehabilitation centers, Coimbatore. The statistical analysis showed that there was an improvement in level of upper extremity function after implementation of mCIMT in post stroke hemiparetic patients when compared to pre-test. Also there was a difference in the post test scores on level of upper extremity function among interventional group and the control group. Thus this study proved the effectiveness of mCIMT on level of upper extremity among post stroke hemiparetic patients.

Implications

Many stroke patients have lots of physical, mental and social problems after stroke. They would like to get back to normal life as soon as possible. If they regularly practice modified constraint induced movement therapy they can get their normal life back. The researcher has drawn the following implications from the study. This is a vital concern for Nursing Practice, Nursing Education, Nursing Administration and Nursing Research.

Nursing Practice

- Nurses play a significant role in stroke rehabilitation and helping the individual to stay well, overcome or cope with disease and restore normal function.
- Nurses should be more vigilant in educating and supervising the care givers to continue the practice for long duration.
- Nursing personnel working in the stroke rehabilitation clinics and unit should be given in-service education to update and improve their knowledge regarding modified constraint induced movement therapy.

Nursing education

- ❖ This study will enhance the nursing students to acquire knowledge about modified constraint induced movement therapy and its importance in improving level of upper extremity function among stroke patients.
- ❖ Nursing curriculum needs to be updated to identify the aspects of nursing care, role and responsibilities of nurses in stroke rehabilitation and modified constraint induced movement therapy.
- ❖ Nurse educators should create awareness regarding stroke rehabilitations and new techniques available to improve the level of motor arm function and quality of life of stroke patients.

Nursing administration

- ✓ Nurse administrators should be vigilant to organize various staff development programs to educate the nurses on importance of modified constraint induced movement therapy as an adjunct to improve upper extremity function.
- ✓ Nurse administrator should motivate the nurses to implement modified constraint movement therapy while caring the patients.

Nurse research

- ➢ This study can be a baseline for further studies to build upon and motivate the researchers to conduct further studies.
- ➢ The generalization of study can be made by further replication of the study.
- ➢ As Nursing profession focuses on evidence based practice, the nursing personnel should involve in research activities to come out with successful remedies to reduce the burden of various diseases.

Recommendations

- ❖ The study can be replicated on large sample in different settings like home rehabilitation unit and other rehabilitation centers.
- ❖ The study can be replicated to different target populations like cerebral palsy and Parkinson disease.
- ❖ A longitudinal study can be undertaken to see the long term effect of modified constraint induced movement therapy on level of upper extremity function.
- ❖ A similar study can be undertaken by using random sampling technique to generalize findings.
- ❖ A comparative study could be conducted to evaluate the effectiveness of modified constraint induced movement therapy with other therapies (Mirror therapy, Robot assisted therapy) in post stroke hemiparetic patients.
- ❖ A descriptive study can be conducted to determine the knowledge and attitude of health care professionals towards stroke rehabilitation.

Summary

This chapter dealt with summary, conclusion, implications for nursing practice and recommendations.

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ANNEXURE- A

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

From

Mr. Brunow.W
M.Sc. (N) Final Year,
Kongunadu College Of Nursing,
Coimbatore.

To

The Administrator,
Global Neuro Rehabilitation Center,
Coimbatore.

Respected Sir/Madam,

Sub: Letter seeking permission to conduct the study: Reg

I, Mr. Brunow.W final year M.Sc (Nursing) Student of Kongunadu College of Nursing is conducting research project in partial fulfillment of the Tamil Nadu Dr.M.G.R. Medical University, Chennai, as a part of the requirement for the award of M.sc (Nursing) Degree.

TOPIC: "Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".

I request you to kindly do the needful.

Thanking you,

Yours faithfully,

(Mr. Brunow.W**)**

Place: Coimbatore
Date:

ANNEXURE - A

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

From

Mr. Brunow.W
M.Sc. (N) Final Year,
Kongunadu College of Nursing,
Coimbatore.

To

The Administrator,
Seesha Rehabilitation Center,
Coimbatore.

Respected Sir/Madam,

Sub: Letter seeking permission to conduct the study: Reg

I, Mr. Brunow.W final year M.Sc (Nursing) Student of Kongunadu College of Nursing is conducting research project in partial fulfillment of the Tamil Nadu Dr.M.G.R. Medical University, Chennai, as a part of the requirement for the award of M.Sc (Nursing) Degree.

TOPIC: "Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".

I request you to kindly do the needful.

Thanking you,

Yours faithfully,

(Mr. Brunow.W**)**

Place: Coimbatore
Date:

ANNEXURE - A

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

From

Mr. Brunow.W
M.Sc. (N) Final Year,
Kongunadu College of Nursing,
Coimbatore.

To

The Administrator,
Sivasakthi Hi-tech Physiotherapy Center,
Coimbatore.

Respected Sir/Madam,

Sub: Letter seeking permission to conduct the study: Reg

I, Mr. Brunow.W final year M.Sc (Nursing) Student of Kongunadu College of Nursing is conducting research project in partial fulfillment of the Tamil Nadu Dr.M.G.R. Medical University, Chennai, as a part of the requirement for the award of M.Sc (Nursing) Degree.

TOPIC: "Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".

I request you to kindly do the needful.

Thanking you,

Yours faithfully,

(Mr. Brunow.W**)**

Place: Coimbatore
Date:

ANNEXURE-B

LETTER GRANTING PERMISSION TO CONDUCT THE STUDY

From,

The Administrator,
Global Neuro Rehabilitation Center,
Coimbatore.

Sub: Permission to conduct the study in global Neuro Rehabilitation Center, Coimbatore.

With reference to the letter, it has been informed that Mr. Brunow.W final year M.Sc Nursing Student of Kongunadu College of Nursing is allowed to conduct the study on "**Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore"** in our center. In this regard the employee of the Global neuro rehabilitation center has been directed to provide full help and co-operation in facilitating the study.

With Thanks,

Yours faithfully,

Dr. R. THAMILMANI,
BPT.,MPT(Neuro).,MIAP.,
REG. No: L-28253,
CHIEF NEURO PHYSIOTHERAPIST,
GNRC, COIMBATORE-47.

Place : Coimbatore

Date :

ANNEXURE-B

LETTER GRANTING PERMISSION TO CONDUCT THE STUDY

From,

The Administrator,
Seesha Rehabilitation Center,
Coimbatore.

Sub: Permission to conduct the study in Seesha Rehabilitation Centre, Coimbatore.

With reference to the letter, it has been informed that Mr. Brunow.W final year M.Sc Nursing Student of Kongunadu College of Nursing is allowed to conduct the study on "**Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore"** in our center. In this regard the employee of the Seesha rehabilitation center has been directed to provide full help and co-operation in facilitating the study.

With Thanks,

Yours faithfully,

Place: Coimbatore
Date:

ANNEXURE-B

LETTER GRANTING PERMISSION TO CONDUCT THE STUDY

From,

The Administrator,
Sivasakthi Hi-tech Physiotherapy Center
Coimbatore.

Sub: Permission to conduct the study in Sivasakthi Hi-tech Physiotherapy Center, Coimbatore.

With reference to the letter, it has been informed that Mr. Brunow.W final year M.Sc. Nursing Student of Kongunadu College of Nursing is allowed to conduct the study on "**Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore"** in our center. In this regard the employee of the Sivasakthi Hi-tech Physiotherapy Center has been directed to provide full help and co-operation in facilitating the study.

With Thanks,

Yours faithfully,

Place: Coimbatore
Date :

ANNEXURE - C

LETTER REQUESTING OPINION AND SUGGESTIONS OF EXPERT FOR CONTENT VALIDATION OF THE RESEARCH TOOL

From

Mr.Brunow. W
Final year M.Sc (N)
Medical Surgical Nursing Department
Kongunadu College of Nursing
Coimbatore, Tamil Nadu.

To

Respected Madam,

Subject: Requesting opinion and suggestions of experts for establishing content validity of the tool: Reg

I, **Mr.Brunow. W** final year M.Sc.(Nursing) student of Kongunadu College of Nursing, Coimbatore, have selected the below mentioned statement of the problem for the research study to be submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai as partial fulfillment for the award of Master of Science in Nursing.

Topic: "Effectiveness of modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".

I request you to kindly validate the tools and content developed for the study and give your expert opinion and suggestions for necessary modifications.

Thanking you,

Yours Sincerely,

Date:
Place: Coimbatore **(Brunow. W)**

Enclosed:

1. Certificate of validation
2. Criteria checklist for evaluation of tool
3. Tool for collection of data
4. Content on intervention

ANNEXURE- D

LIST OF EXPERTS FOR VALIDATION

1. **Dr. K.K. Pracheet. MD.DM,**
   Neuro Physician,
   Kongunad Hospitals Pvt. Ltd,
   Coimbatore.

2. **Dr. Shyla Isacc. M.Sc (N)., Ph.D.**
   Principal,
   Shree Abirami College of Nursing,
   Coimbatore.

3. **Prof. Debhoraha Pakiyajothi, M.Sc (N),**
   Vice Principal,
   HOD, Medical Surgical Nursing Department,
   GEM College of Nursing,
   Coimbatore.

4. **Prof. Balasubramaniam, M.Sc (N),**
   Medical Surgical Nursing Department,
   KMCH College of Nursing,
   Coimbatore.

5. **Prof. P. Kuzhanthaivel, M.Sc (N),**
   Medical Surgical Nursing Department,
   KMCH College of Nursing,
   Coimbatore.

6. **Mrs. Jean Tresa, M.Sc (N),**
   Associate Professor,
   Medical Surgical Nursing Department,
   Sri Ramakrishna Institute of Paramedical Science,
   Coimbatore.

ANNEXURE – E

CERTIFICATE OF VALIDATION

This is to certify that the tool and content developed by **Mr.Brunow.W**, final year M.Sc. Nursing student of Kongunadu College Of Nursing, Coimbatore (affiliated to The Tamil Nadu Dr. M.G.R. Medical University) is validated and can proceed with this tool and content for the main study entitled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".**

Signature of the Validator

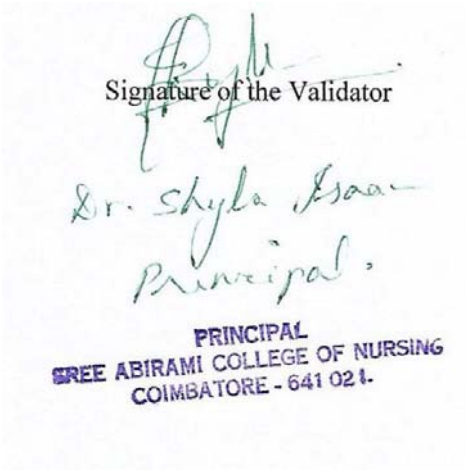
Dr. K.K. PRACHET
D.M (Neurology)
Consultant Neurologist
52379
Kongunad Hospitals (P) Ltd

Name : Dr. K.K. Pracheet MD.DM
Designation: Neuro Physician
Kongunad hospitals pvt ltd,
Coimbatore.

ANNEXURE – E

CERTIFICATE OF VALIDATION

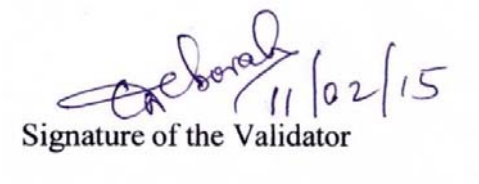
This is to certify that the tool and content developed by **Mr.Brunow.W**, final year M.Sc. Nursing student of Kongunadu College Of Nursing, Coimbatore (affiliated to The Tamil Nadu Dr. M.G.R. Medical University) is validated and can proceed with this tool and content for the main study entitled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".**



ANNEXURE – E

CERTIFICATE OF VALIDATION

This is to certify that the tool and content developed by **Mr.Brunow.W**, final year M.Sc. Nursing student of Kongunadu College Of Nursing, Coimbatore (affiliated to The Tamil Nadu Dr. M.G.R. Medical University) is validated and can proceed with this tool and content for the main study entitled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".**



Name **:** Prof. DebhorahaPakiyajothi, M.Sc (N),

Designation: HOD, Medical Surgical Nsg Dept,

Date : 10.02.15

ANNEXURE – E

CERTIFICATE OF VALIDATION

This is to certify that the tool and content developed by **Mr.Brunow.W**, final year M.Sc. Nursing student of Kongunadu College Of Nursing, Coimbatore (affiliated to The Tamil Nadu Dr. M.G.R. Medical University) is validated and can proceed with this tool and content for the main study entitled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".**

K. Balasubramaniam
Signature of the Validator

Name : Mr. Balasubramaniam, M.Sc (N)

Designation: Professor, Medical Surgical Nursing Dept,

Date : 13.02.15

ANNEXURE – E

CERTIFICATE OF VALIDATION

This is to certify that the tool and content developed by **Mr.Brunow.W**, final year M.Sc. Nursing student of Kongunadu College Of Nursing, Coimbatore (affiliated to The Tamil Nadu Dr. M.G.R. Medical University) is validated and can proceed with this tool and content for the main study entitled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".**

P. Kuzhth

Signature of the Validator

Name : P. Kuzhanthaivel

Designation : Professor

Date : 12.02.2015

ANNEXURE – E

CERTIFICATE OF VALIDATION

This is to certify that the tool and content developed by **Mr.Brunow.W**, final year M.Sc. Nursing student of Kongunadu College Of Nursing, Coimbatore (affiliated to The Tamil Nadu Dr. M.G.R. Medical University) is validated and can proceed with this tool and content for the main study entitled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore".**

Signature of the Validator

Name : Mrs. Jean Tresa, M.Sc (N),
Designation: Assoiate Professor,
Date : 12. 02. 2015

ANNEXURE – F

TOOL FOR DATA COLLECTION

SECTION-A

Baseline Performa **Number of the sample:**

1. Age
    a) 30-40 years ☐
    b) 41-50 years ☐
    c) 51-60 Years ☐
2. Sex
    a. Male ☐
    b. Female ☐
3. Education
    a) No primary education ☐
    b) Primary education ☐
    c) Secondary education ☐
    d) Higher secondary ☐
    e) Degree & above ☐
4. Occupation
    a) Heavy workers ☐
    b) Moderate workers ☐
    c) Sedentary workers ☐
5. Social Habit:
    a) Smoking ☐
    b) Alcoholism ☐
    c) Smoking & alcoholism ☐
    d) Chewing tobacco ☐
    e) Other habits ☐
    f) No habits ☐

6. Food habit
    a. Vegetarian ☐
    b. Non vegetarian ☐
7. Do you practice regular exercise
    a. Yes ☐ specify if any-
    b. No ☐
8. Supportive members in family
    a) Parents ☐
    b) Spouse ☐
    c) Children ☐
    d) Siblings ☐
    e) Others ☐

SECTION-B

CLINICAL VARIABLES

1. Type of stroke
    a. Hemorrhagic stroke ☐
    b. Ischemic stroke ☐
2. Duration of stroke
    a. 3-5 months ☐
    b. 5-7 months ☐
    c. 7-9 months ☐
3. Side of hemiparesis
    a) Right arm ☐
    b) Left arm ☐
4. Prestroke dominant side
    a) Right arm ☐
    b) Left arm ☐
5. Duration of rehabilitation
    a) Never ☐
    b) Less than 3 months ☐
    c) 3-5 months ☐
    d) 6-9 months ☐

SECTION-C

MOTOR ACTIVITY LOG

S. NO	SUBTESTS	Amount scale						How well scale					
		0	1	2	3	4	5	0	1	2	3	4	5
1	Steady oneself while standing												
2	Put arm through sleeve of clothing												
3	Carry an object in hand from place to place												
4	Pick up cup by handle												
5	Hold a book, journal or magazine/turn pages for reading												
6	Use towel to dry face or other part of the body												
7	Comb hair												
8	Pick up tooth-brush and brush Teeth												
9	Eat with spoon												
10	Cut nails												
11	Letter writing/typing												
12	Pour coffee/tea												
13	Dial a number on the mobile phone												
14	Take money out of a wallet/purse												
15	Peel fruit or potatoes												

GUIDELINES FOR SCORING

Amount scale	Score
Did not use weaker arm (**not used**).	**0**
Occasionally used weaker arm but only very rarely (**very rarely)**.	**1**
Sometimes used weaker arm but did the activity most of the time with stronger arm (**Rarely)**.	**2**
Used weaker arm about half as much as before the stroke (**Half pre-stroke**).	**3**
Used weaker arm almost as much as before the stroke (**3/4 pre-stroke**).	**4**
Used weaker arm as often as before the stroke (**same as pre-stroke**).	**5**

How Well Scale	Score
Weaker arm was not used at all for that activity (**not used**).	**0**
Weaker arm was moved during that activity but was not helpful (**very poor**).	**1**
Weaker arm was of some use during that activity but needed some help from the stronger arm, moved very slowly, or with difficulty (**poor**).	**2**
Weaker arm was used for that activity but the movements were slow or were made only with some effort (**fair**).	**3**
The movements made by weaker arm for that activity were almost normal but not quite as fast or accurate as normal (**almost normal**).	**4**
The ability to use weaker arm for that activity was as good as before the stroke (**normal**).	**5**

SECTION D

MODIFIED SOLLERMAN GRIP FUNCTION TEST

S.No	Subtests
1.	Pick coins up from flat surface, put into purses mounted on wall.
2.	Open/close zip.
3.	Lift wooden cubes over edge 5 cm in height.
4.	Unscrew lid of jars.
5.	Do up buttons.
6.	Write with pen.
7.	Fold paper, put into envelope.
8.	Pickup nuts
9.	Lift mobile, put to ear.
10.	Pour water from jug.

GUIDELINES FOR SCORING OF SUBTESTS

S.No	Performance	Scores
1.	The task is completed without any difficulty within 20 seconds and with the prescribed hand-grip of normal quality.	4
2.	The task is completed, but with slight difficulty, or the task is not completed within 20 seconds, but within 40 seconds, or the task is completed with the prescribed hand-grip with slight divergence from normal.	3
3.	The task is completed, but with great difficulty, or the task is not completed within 40 seconds, but within 60 seconds, or the task is not performed with the prescribed hand-grip.	2
4.	The task is only partially performed within 60 seconds.	1
5.	The task cannot be performed at all.	0

பிரிவு – அ

தனிநபர் விபரம்

1. வயது

   அ) 30 முதல் 40 வயதுவரை

   ஆ) 41 முதல் 50 வயதுவரை

   இ) 51 முதல் 60 வயதுவரை

2. பாலினம்

   அ) ஆண்

   ஆ) பெண்

3. கல்வித்தகுதி

   அ) அடிப்படைக்கல்வி இல்லாதவர்கள்

   ஆ) தொடக்கக்கல்வி

   இ) இடைநிலைக்கல்வி

   ஈ) மேல்நிலைக்கல்வி

   உ) பட்டப்படிப்பு முடித்தவர்கள்

4. தொழில் நிலை

   அ) கடினமான வேலைபுரியும் தொழிலாளர்கள்

   ஆ) நடுத்தரமான வேலைபுரியும் தொழிலாளர்கள்

   இ) சரீர உழைப்பு குறைவாக உள்ளதொழிலாளர்கள்

5. சமூகபழக்கம்

அ) புகைப்பிடித்தல்

ஆ) குடிப்பழக்கம்

இ) புகைப்பிடித்தல் மற்றும் குடிபழக்கம்

ஈ) புகையிலைமெல்லுதல்

உ) மற்றவைகள், குறிப்பிடவும்----------

ஊ) எந்த பழக்கமும் இல்லை

6. உணவுமுறை

அ) சைவம்

ஆ) அசைவம்

இ) மற்றவர்கள், குறிப்பிடவும்

7. நீங்கள் பக்கவாதத்தின் இந்த அத்தியாயத்திற்கு முன்பு வழக்கமாக உடற்பயிற்சி செய்பவரா ?

அ) ஆம்

ஆ) இல்லை

8. குடும்பத்தில் தங்களுக்கு ஆதரவாக உள்ள நபர்கள்

அ) பெற்றோர்

ஆ) வாழ்க்கைத் துணை

இ) குழந்தைகள்

ஈ) உடன் பிறப்புகள்

உ) மற்றவர்கள், குறிப்பிடவும்----------

பிரிவு – ஆ

மருத்துவம் சார்ந்த காரணிகள்

1. பக்கவாதத்தின் வகை

அ) இரத்தக் கசிவு வகையை சார்ந்தது

ஆ) குருதியோட்டக் குறைவு வகையை சார்ந்தது

2. பக்கவாதமாகிய காலம்

அ) 3 – 5 மாதங்கள்

ஆ) 5 – 7 மாதங்கள்

இ) 7 – 9 மாதங்கள்

3. பாதிக்கப்பட்ட கரங்கள்

அ) வலது கை

ஆ) இடது கை

4. பக்கவாதத்திற்கு முன்பு மேலாதிக்கப்புறம்

அ) வலது கை

ஆ) இடது கை

5. மறுவாழ்வு மையத்தில் தங்கி இருக்கும் காலம்

அ) 3 மாதங்களை விடகுறைவு

ஆ) 3 – 5 மாதங்கள்

இ) 6 – 9 மாதங்கள்

பிரிவு இ

இயக்க சக்தி செயல்பாடு பதிவு

வ. எண்	துணை சோதனைகள்	எப்படி அளவீடு						அளவு அளவீடு					
		0	1	2	3	4	5	0	1	2	3	4	
1.	தானே தனித்து நிற்க												
2.	ஆடையின் கைபகுதி வழியாக கையை நுழைக்கவும்.												
3.	பொருளை ஒரு இடத்தில் இருந்து மற்றொரு இடத்திற்கு கையால் எடுத்து மாற்றுக.												
4.	கைப்பிடியை பயன்படுத்தி குடிக்கும் கிண்ணத்தை எடுக்கவும்.												
5.	ஒரு புத்தகம், பத்திரிக்கை அல்லது இதழைகையில் பிடிக்கவும் / வாசிப்பதற்காக பக்கங்களை திருப்பவும்.												
6.	துடைக்கும் துணியை பயன்படுத்தி முகம், உடல் மற்ற பாகங்களை துவட்டிக் கொள்ளவும்.												
7.	துலை முடியை வாரிக் கொள்ளவும்.												
8.	பல் தூரிகையை எடுத்து, பல் துலக்கவும்.												
9.	கரண்டியால் சாப்பிடவும்.												
10.	நகங்களை வெட்டவும்.												
11.	கடிதம் எழுதவும் / தட்டச்சுக் கருவி கொண்டு தட்டெழுத்து அடிக்கவும்.												
12.	காப்பி / தேநீர் ஊற்றவும்.												
13.	கைப்பேசியில் ஒரு தொலைபேசி எண்ணிற்கு தொடர்பு கொள்ளவும்.												
14.	கைப்பையில் / பணப்பையில் இருந்து பணத்தை எடுக்கவும்.												
15.	உருளைக்கிழங்கு அல்லது பழங்களின் தோலை நீக்கவும்.												

மதிப்பெண் வழிமுறைகள்:

அளவுஅளவீடு	மதிப்பெண்
பலவீனமான கையை பயன்படுத்தவில்லை.	0
வெகு அரிதாகவே பலவீனமான கை பயன்படுத்தப்பட்டது **(மிகவும்அரிதாக)**	1
சில நேரங்களில் பலவீனமான கை பயன்படுத்தப்பட்டது, ஆனால் வலுவான கை கொண்டு பெரும்பாலான நேரம் வேலை செய்யப்பட்டது. **(அரிதாக)**	2
பக்கவாதத்திற்கு முன்பு போல் பாதியளவு பலவீலமான கை பயன்படுத்தப்பட்டது. **(பாதியளவு பயன்படுத்தப்பட்டது)**	3
பக்கவாதத்திற்கு முன்பு போல் ஏறக்குறைய பலவீனமான கை பயன்படுத்தப்பட்டது. **(3/4 பயன்படுத்தப்பட்டது)**	4
பக்கவாதத்திற்கு முன்பு போல் அடிக்கடி பலவீனமான கை பயன்படுத்தப்பட்டது. **(பக்கவாதத்திற்கு முன்பு போல்)**	5

எப்படிஅளவீடு	மதிப்பெண்
பலவீனமான கை எந்த நடவடிக்கைக்கும் பயன்படுத்தப்படவில்லை. **(பயன்படவில்லை)**	0
பலவீனமான கை செயல்பாட்டின் போது அசைக்கப்படுகிறது. ஆனால் பயனுள்ளதாக இல்லை .**(மிகவும் மோசம்).**	1
பலவீனமான கை செயல்பாட்டின் போது உபயோகப்படுகிறது. ஆனால் வலுவான கையின் உதவி தேவைப்படுகிறது. மிகவும் மெதுவாக அசைகிறது அல்லது கஷ்டமாக உள்ளது. **(மோசம்).**	2
பலவீனமான கை செயல்பாட்டின் போது பயன்படுத்தப்படுகிறது. ஆனால் இயக்கங்கள் மெதுவாக உள்ளது அல்லது சில முயற்சிகளின் போது செயல்படுகிறது.	3
பலவீனமான கையின் செயல்பாடு கிட்டத்தட்ட இயல்பாக ஆனால் மிகவேகமாக இல்லை.	4
பலவீனமான கையை பயன்படுத்தும் திறன் பக்கவாதத்திற்கு முன்பு உள்ளது போல் நன்றாக உள்ளது. **(இயல்பாக).**	5

பிரிவு–ஈ

திருத்தப்பட்ட ஷாலர்மேன் கைபிடி செயல்பாட்டு பதிவு ஏடு

வ.எண்	துணைசோதனைகள்	0	1	2	3	4
1.	தட்டையான இடத்தில் இருந்து நாணயங்களை எடுத்து, பணப்பையில் போடவும்.					
2.	பையைத் திறக்கவும் / மூடவும்					
3.	மரக்கட்டையை 5 செ.மீ உயரத்திற்கு மேல் தூக்கவும்					
4.	ஜாடியின் மூடியை திறக்கவும்					
5.	சட்டையின் பொத்தான்களை கழற்றவும்					
6.	பேனா கொண்டு எழுதவும்					
7.	காகிதத்தை மடித்து உறையில் போடவும்					
8.	விதைகளைப் பொறுக்கி எடுக்கவும்					
9.	கைப்பேசியை எடுத்து காதில் வைக்கவும்					
10.	நீர்குவளையில் இருந்து தண்ணீர் ஊற்றவும்.					

துணைசோதனைகளுக்கானமதிப்பெண் வழிமுறைகள்:–

வ. எண்	செயல்திறன்	மதிப் பெண்
1.	பணியானது மிக எளிதாக நிறைவுற்றது மற்றும் பணியானது 20 நொடிகளில் நிறைவுற்றது.	4
2.	பணியானது சற்றே சிரமத்துடன் நிறைவுற்றது அல்லது பணி 20 நொடிகளில் நிறைவு பெறவில்லை, ஆனால் 40 நொடிகளில் நிறைவுற்றது.	3
3.	பணியானது மிகவும் கஷ்டப்பட்டு நிறைவுற்றது அல்லது பணி 40 நொடிகளில் நிறைவு பெறவில்லை, ஆனால் 60 நொடிகளில் நிறைவுற்றது.	2
4.	பணி பகுதியளவு மட்டுமே 60 நொடிகளுக்குள் நிறைவுற்றது.	1
5.	பணி ஏதும் செய்யப்படவில்லை.	0

ANNEXURE - G

CERTIFICATE OF EDITING

TO WHOMSOEVER IT MAY CONCERN

Certify that the dissertation paper titled "**Effectiveness of Modified Constraint Induced Movement Therapy (mCIMT) on Upper Extremity Function among Post Stroke Hemiparetic Patients at Selected Rehabilitation Centers, Coimbatore"** by Mr.Brunow.W. It has been checked for accuracy and correctness of English language used in presenting the paper is lucid, unambiguous free of grammatical or spelling errors and apt for the purpose.

Signature with date

A.ARUL SAHAYARAJ, M.A., B.Ed.,
B.T Asst. in English.
St. Antony's Hr. Sec. School,
Kosavapatty, DINDIGUL - 624 304.

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Signature of validator

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B.Ed.,

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அன்னூர், கோவை மாவட்டம் pin-641 653

ANNEXURE – H

MODIFIED CONSTRAINT INDUCED MOVEMENT THERAPY (mCIMT)

Modified constraint induced movement therapy is a more recent approach to stroke rehabilitation. mCIMT encourages the patient to use the weakened extremity by restricting movement of the normal extremity.

Goal

- ❖ Improve upper extremity function.
- ❖ Facilitate overall performance in daily activities of living skills, work related task, school activities, recreational activities and social participation.
- ❖ Offer an evidence-based, intensive and therapist-guided practice of movement.
- ❖ Enhance motivation through social support.

Mechanism of action

Stroke patients' stops using the affected limb because they are discouraged by the difficulty, as a result a process that called "learned non-use" sets in, furthering the deterioration. Learned non-use is a type of negative feedback. Individuals are unable to move their affected limb or the movements are inefficient and clumsy and in response to this a suppression of movement occurs. mCIMT is an engaging the patient to repetitive exercises with the affected limb, which helps the brain grows new neural pathways. This change in the brain is referred to as cortical reorganization or neuroplasticity.

DURATION OF THE PROCEDURE:

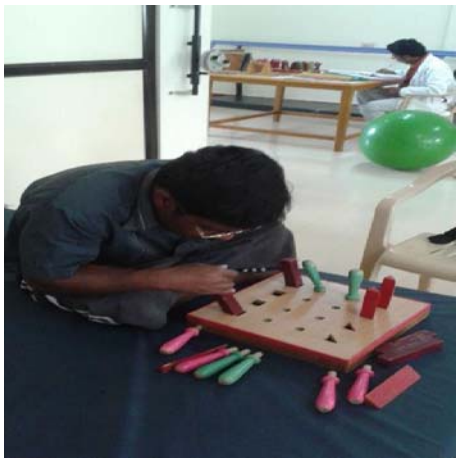
The repetitive task was practiced on affected arm for a period of 4 hours, for 2 consecutive weeks.

Steps of procedure

- Making the patient to sit comfortably
- Patients functional activity is assessed for 10-20 trials
- Restrain the unaffected upper limb with cotton padded split for 4-5 hrs, in which repetitive training given in affected upper extremity for 4 hrs for six consecutive days and the splints are removed.
- Regular practice can be encouraged for longer duration for better results.
- After the implementation of training, the level of upper extremity function is assessed through Motor Activity Log, modified Sollerman Hand grip function Scale and Wolf Motor Function Scale etc.

ANNEXURE – I

PHOTOS



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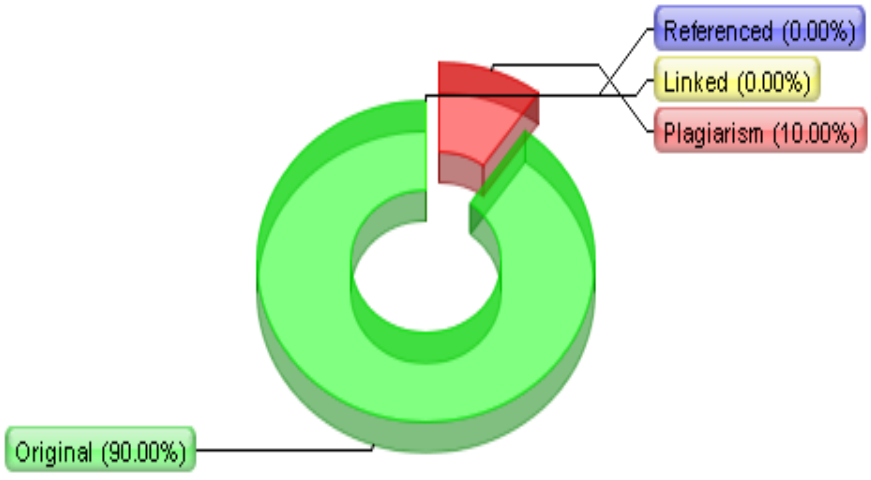

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